JOURNAL

OF

THE FRANKLIN INSTITUTE

OF THE STATE OF PENNSYLVANIA,

FOR THE

PROMOTION OF THE MECHANIC ARTS.

FEBRUARY, 1859.

CIVIL ENGINEERING.

*Canals and Canal Conveyance.** By W. O'Brien, C. E.

[Extracts from the Prize Essay on Canals and Canal Conveyance for which a premium of £100 was awarded by the Canal Association.]

(Continued from page 26.)

It has often been argued that large and deep canals offer more resistance than those with a small sectional area. Granting this to be true (and in our present state of knowledge of hydraulics the fact has to be verified), we find that this argument in favor of maintaining the old dimensions loses much of its importance when we consider that all canals are frequented by boats drawing various depths of water: now, on the other hand, the power of increasing at any time the size and draft of water of boats is of great importance. Then as to steam towing in particular, every one knows that steam engines cost less per H. P. the larger they are, and that no more men are required to work a 200 tons steamer than to work one of 100 tons. Besides, steamers traveling much faster than boats tracked by horses, would probably require a little more room for crossing each other without stopping the engines.

The widening of the pounds is not of so much importance as that of the locks, because the former can be done gradually and according to the wants of navigation (where traffic is not very brisk the width should be calculated for a single boat with occasional sidings), whereas, the latter is an expense which cannot be divided. To be accessible to trains

* From the Lond. Civ. Eng. and Arch. Journal, Oct., 1858.]

of boats, as on the Severn navigation, they should have the length of the longest train, and at least three pairs of gates, more if water is scarce, so as never to draw from the upper pounds more water than that strictly sufficient for navigation. It is needless to say, then, it takes no more water to pass two or more boats at a time than separately.

Supposing it to be granted that a wider sectional area and enlargement of locks are necessary, it becomes evident that the supply of water must be considerably increased, or else means must be found for diminishing the expenditure, principally that due to lockage.

The first object can be attained, 1st, by deepening the cuttings at the summit levels; 2d, by increasing the dimensions of reservoirs; 3d, by artesian borings (Kind's system is the best) properly and carefully applied; 4th, when these means fail to bring water to the requisite height in sufficient quantity, recourse must be had to machinery: the Cornish engine must be applied,—it is in most cases the best.

The second object, that of diminishing the expenditure of water, can only be attained by two means: either suppressing locks altogether, and having recourse to machinery for raising or lowering boats from one level to another; or by restoring to each lock the quantity taken out of it for the passage of each boat.

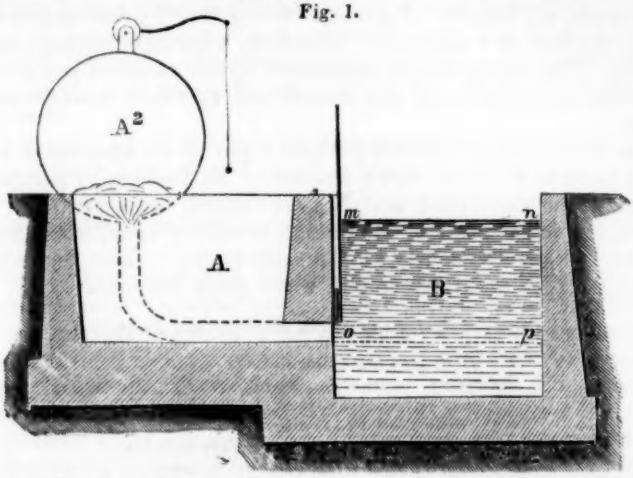
Inclined planes require machinery of the most expensive description, and can never work cheaply, because the machinery has to develop great efforts at a given time. Generally, engines used intermittently give a bad result, because a great deal of steam is wasted, and because they must be made on large dimensions. When the same work can be done gradually, a smaller engine answers the purpose. This is probably one of the reasons why locks have been maintained in preference to inclined planes, even in cases where it has been found necessary to raise water for lockage at a height varying from 50 to 70 ft., as in the case of the Ering summit level. If I were to advocate any mechanical mode of raising boats from one level to another, I would suggest the hydraulic press.

If a reservoir A, or a second lock, be made next to the one in use, B, Fig. 1, with a sluice at S, to open or shut off its communication with B, it will enable one to save half a lockfull; for supposing *m n* and *o p* to be the level of the water in the upper and lower pound, if we want a boat, say to go down, we shall open the sluice at S and turn out the water remaining in the lock into the lower pound; we shall thus have half a lockfull ready for an ascending boat.

I now come to a recent invention of a French engineer, M. Andraud, for restoring the water momentarily abstracted from the lock for the passage of each boat. With M. Andraud's invention, we save the entire lockfull, instead of half, as in the preceding case; for reservoir A^2, instead of being open, is shut in and air-tight, and communicates with an air-pump, which rarefies the air in A^2 till all the prism of water in *m n o p* is introduced into A^2. To the air-pump may be substituted a small coal fire; I believe it is this system which was originally proposed by the inventor. This seems a really practical invention.

An important object of consideration is the loss of time in passing from one lock to another. Wherever the supply of water is sufficient, let locks be made as deep as possible, so as to reduce to a minimum the number of locks necessary for a given total fall. I see no reason

Fig. 1.



for giving the lower locks the same dimensions as the upper ones; let them be larger if they can easily be supplied with water. Signals should be used to warn the lockmen at the approach of boats; double locks should be preferred, although they cost more; the openings for admitting water should be larger.

If it is allowed that a large sectional area is necessary, then it is evident that too much importance cannot be given to river navigation. I much doubt whether it was a right step to establish several miles of canal parallel to rivers—as the Kennet and Avon Canal parallel to the Kennet, the Rhone au Rhin Canal parallel to two rivers (the Rhine and the Ill), &c.—instead of improving the bed of the rivers themselves, and simply shortening the distances by cuts avoiding the bends. It will be urged that the establishment of locks and weirs in some rivers would be very difficult; then let our endeavors, by all means, be directed towards improving this branch of hydraulic engineering.

There is no doubt that foundations in a large river, with strong current, are very expensive, but this part of the engineer's art has much improved since Brindley and Brisson. Persons interested in this branch of construction would do well to read the accounts of the Chester and Rochester bridges, the French and German works on the process known as "foundation sur encaissement."

It will be asked, what would be the expense of widening our canals, and applying some of the alterations proposed? That is impossible to say; but the alterations can be made gradually, and we can assign a limit to the expenditure. We can expend as much on the establishment of a canal line as is spent on the nearest parallel railway, and have nothing to fear from the latter; as the cost of conveyance, exclusive of general expense, is less on the canal than on the railway.

The object of canal or boat proprietors should not be to adapt the form and dimensions of boats to those of canals, or *vice versâ*, but rather to adapt both to a direct communication with rivers, harbors, and estuaries, in such a manner as to suppress, or at least to reduce to a minimum, all transfer of goods, avoiding thereby destruction of property, expense of loading and unloading, wharfage, agency, and loss of time. This object cannot be attained by the canal owners alone, but needs the co-operation of the inland and maritime conveyance companies.

The table annexed reduces to three types all the systems of machinery at present in use on screw steamers. M. Inshaw, of Birmingham, has built, for the Grand and Regent's canal, boats with two screws astern, one on each side of the rudder, revolving in opposite directions, and worked simultaneously by the same engine; these boats are said to be very good and to steer well when going stern on.

Different Systems of Steam Engines and Propellers.

One or two screws revolving rapidly and finely pitched.	High-pressure non-condensing locomotive engines, acting directly on the main shaft, two or four cylinders; cranks acting at right angles; lap and lead of slide valves; no special apparatus for expansion; tubular boilers and steam jet; pressure of steam as high as possible.	Very suitable for small boats.	If two screws are applied they should work in opposite directions, and the engines should be so disposed as to be easily disconnected in case of accident to one of the screws.
	Low-pressure condensing engines with expansion gear, multiplying beveled gear; air-pump worked by a crank or main shaft. Not necessary to have more than one cylinder.	A sudden jerk may break the beveled wheels, and thereby render the engines useless	
One or two screws with a coarse pitch revolving slowly.	Low-pressure condensing engines work'g directly on the main shaft; air-pump worked by a separate (!) engine; special apparatus for expansion: two or four cylinders with cranks acting at right angles.		
Two paddles astern or in the middle.	Same as preceding; but the air-pump can be worked by a crank on the main shaft.	Not advocated	The hand gear, pressure gauge, &c., to be on deck; the boilers to be fed by a separate engine or donkey.

As to ship canals, the mere inspection of a map will at once give an idea of the localities most favorable to works of such magnitude. Might not a line be found favorable for a direct ship navigation from Galway or Limerick to the German Ocean, thus avoiding the Channel? The Forth and Clyde estuaries have already been suggested by Mr. Macpharlane; a line from Newcastle to Carlisle, or from Hull to Liverpool, is perhaps feasible: it is proposed to make one from Southampton to the Thames. Ship canals are more frequently supplied from the sea itself; in that case the total fall is limited by the height of the spring tides.

In a description of boat which I propose for river and canal navigation, owing to the peculiar shape of the cross section, fine lines can be obtained underneath without much loss of space. The deck is scarcely tapered at the end, so as to give room for loading and unloading.

In the ordinary boat with two screws, the engine acts on the screw shafts by means of beveled gear, so that if the latter breaks down, which is a frequent occurrence, the engine is of no use. I propose that the engines work directly on the screw shafts, a strap connecting the two screws, but only to ensure regularity of working; if it breaks, the only effect will be that the engines will work separately.

Experience alone can show the best dimensions of boats and locks. If 90 feet by 15 feet were found to answer, it would save the necessity of rebuilding on larger dimensions a vast number of our locks; still when a lock is much out of repair, I would advise rebuilding on larger dimensions.

With such powerful means of conveyance as those afforded by railways on one hand, and coasting vessels—screw vessels in particular—on the other, we should be wrong in laying out large sums of money to maintain certain lines of navigation which do not present certain natural resources, and which do not allow, from the unfavorable circumstances in which they are placed, of conveying large quantities in a given time. I am convinced that the future prospects of inland navigation lie in improvement of our rivers, widening of our canals, and application of steam power to towing trains of boats. Except in a few rare cases, we cannot afford to maintain narrow canals; if it be too expensive to widen them, let them be turned to account as feeders to the wide canals, or for water works or agriculture; and the wide canals should be in immediate connexion with our seaports and docks.

This was written before I met with the following passage in one of the most remarkable works ever written, Flachat's "Projet de Canal Maratime de Paris au Havre:"

"Goods can be conveyed by sea more economically than by inland navigation. . . It follows, that even at greater distances seaports enjoy more means of exchange of produce between each other than towns in the interior, since they can communicate at less expense. . . Thus it is that the greatest commercial activity prevails in seaports, for trade extends according to the means of communication. Therefore it is evident that for the greatest good of the country, seaports

should enjoy the most ample means possible of putting the interior in possession of those commodities which can so easily be exchanged from one seaport to another. We can therefore establish as a principle, that a proper system of navigation ought to converge from the interior to the principal ports of the sea coast, and that it is easy to foresee that the most important lines of navigation will be those which join the most flourishing seaports to the towns where the manufactures are the most important or the consumption greatest."

Concluding Remarks.

The best way of proceeding with works is, first, to draw up a list of prices, and pay the builders according to valuation. The advantages are, that better workmanship and better materials are obtained; the builders can content themselves with a moderate profit, because they run no risks; when the works give dissatisfaction they can be stopped, and agreements made with other parties; and the owners are free to change their plans at any time;—or, secondly, combine the two systems, contract for that which is certain, a schedule of prices for what is uncertain.

The question of working expenses is more important in the present position of our canals. A canal may be worked in three different manners: it may be left open to all boats on payment of a toll; or the owners may find boats, steamers, horses, &c., and work them or a part of them at their own cost and risk; or they may make an agreement with a contractor for all or part of the traffic of the line.

The first system cannot very well be applied exclusively, at least by private individuals or companies; such a source of income would fluctuate too much in a great many cases. (When the owners are equally interested in the canal as a property, and in the traffic as a source of income, the canal is worked with more advantage, and the boats and canal are better adapted to each other, than when the interests are entirely separate.) The contract system may be applied here with advantage.

Supposing some of the improvements I have suggested to be carried out, it becomes a question how and where they are to be applied. A general increase of expenditure along a canal would perhaps be rather hazardous. I propose widening and improving our canals,

1st, In localities where a considerable traffic exists or may be expected, and in particular on lines perpendicular rather than parallel to railways.

2d, In the vicinity of harbors, docks, and navigable rivers, effecting as easy a communication with and between them as possible.

3d, Enlarging the pounds only where it can be done at a moderate expense, in other places leaving only room at present for the passage of boats one way, with occasional sidings, till an increase of traffic justifies further expenses.

4th, Rebuilding locks on larger dimensions only when they get out of repair.

5th, Buying property for extensions as soon as possible, particularly

where it can be done without compulsion, but without extending the works till the wants of an increased conveyance make it necessary. In the meanwhile the ground may be let, or otherwise made available.

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Inland Navigation on the Continent.

France.—Notwithstanding the numerous railways which are fast spreading over the country, and the handsome and commodious vessels which ply between the seaports on the coast of France (vessels built on eminently scientific principles, costing from 200 to 500 francs per ton, and conveying freights at very low rates), the traffic on canals and navigable rivers in France has been continually gaining in importance.

Competition seems to have excited the ingenuity of the engineers, as will be seen by some of the following innovations:

Verpilieux's paddle-boats are adapted to stemming the Rhone and other strong currents. The paddles are armed at the periphery with strong iron claws, like the flukes of an anchor, and can be raised or lowered without ceasing to be propelled by the engines. When raised they act in the ordinary manner; when lowered the claws strike the bottom, and a resisting fulcrum being obtained, the most rapid current may be stemmed.

The hydraulic car may be compared to an ordinary locomotive, with this exception, that the driving wheels are propelled by water-power instead of steam, the permanent way being composed of a railway and canal together. It may be useful in turning torrents to account for the conveyance of minerals or timber.

The "barrages mobiles" are simply movable weirs of a more or less ingenious construction. They serve to regulate the regime of a river, and to afford a downward passage to rafts of wood; the passing of such a place is not always void of danger. A description of M. Poirée's barrages ought to be read.

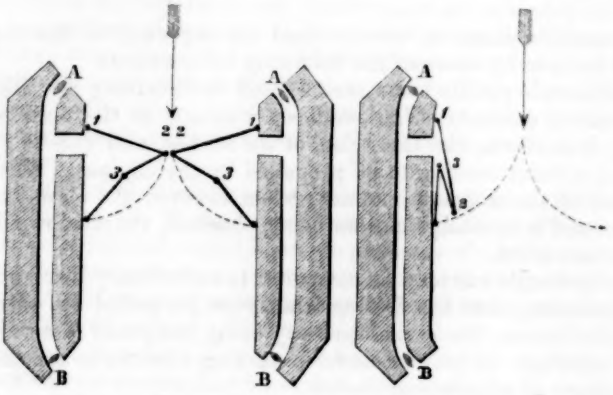
The "bateau Toneur" used on the lower Seine and the Oise is moved by means of a revolving drum on which passes a chain extending all along the bottom. It is used as a tug boat.

Fourneyron's sluice and lock-gate is an ingenious and completely practical invention which that eminent hydraulic engineer proposed some years ago for the weir and lock at the "Monnaie," Paris. Each gate is articulated at 1, 2, 3, (Fig. 2.) A conduit passes through the side wall, and connects the water above, below, and behind the gate. If A be opened and B closed, the water from the upper level fills the conduit, finds its own level behind the gate, and pressing on the panels 1, 2, and 2, 3, closes the gate. If we want to open the gate, we shall close A and open B; the water will run out into the lower level; the pressure above the gate will then be less than the pressure behind it, and it will collapse against the side wall as in Fig. 3. The two sluices A, B, are worked by the same lever, and are made to turn on a pivot, so that scarcely any effort is necessary to open or shut them. This invention has been found by repeated experimemts to be per-

fectly applicable to rivers and canals, whatever may be the difference of level.

Several descriptions of iron steamers, but all of a superior make, now run from Paris to Rouen, Havre, and London. They load and unload in Paris, at the "Cassin de la Vilette," passing by the canal St. Denis. They carry from 150 to 250 tons of freight, and have engines and propellers astern. The propellers are two paddles, one on each side of the stern-post, or one screw before the rudder, or two screws revolving in opposite directions. The Express boats are fine sea-going vessels, with two screws, and taffrail before the funnel. The

Fig. 2. Fig. 3.



"Paris et Londres" are auxiliary screw schooners, conveying cargo in one bottom from Paris to London in five days, including stoppages at Rouen and Havre. Most of these vessels are propelled by condensing engines. Steamers ply on most of the French canals, but steam haulage is seldom applied except on rivers.

Sweden.—The following is communicated to me by a friend, H. Parish, Esq., of New York:

"My opinion is that the application of steam to canal navigation has been more successfully carried out in Sweden than elsewhere; the steamers are all screw steamers, and travel at the rate of 9 to 10 miles an hour, excepting where the canal is narrow, and they are obliged to go at half speed to avoid washing the banks; the engines are small and compact; the cylinders are inclined, and rest upon a hollow bed-plate, which is the condenser; the air-pump and feed-pump are worked either by eccentrics on the main shaft, or directly from the cross head of the piston rod. The hand gear is on deck. This engine is almost universal in Sweden, and is well known, having obtained a medal at the French Great Exhibition. The vessels convey from 150 to 200 tons freight, and could tow several barges."

*On the Measurement of Water by Weir Boards.**

The following report, by JAMES THOMSON, A. M., C. E., Professor of Civil Engineering, Queen's College, Belfast, on the progress of experiments on this subject, was read before the Mechanical Section:—

The experiments proposed to be comprehended in the investigations to which the present interim report of progress relates, have for their object to determine the suitableness of triangular (or V-shaped) notches in vertical plates for the gauging of running water, instead of the rectangular notches in ordinary use. The ordinary rectangular notches, accurately experimented on as they have been, at great cost and with high scientific skill in various countries, with the view of determining the necessary formulas and coefficients for their application in practice, are, for many purposes, suitable and convenient. They are, however, but ill adapted for the measurement of very variable quantities of water, such as commonly occur to the engineer to be gauged in rivers and streams. If the rectangular notch is to be made wide enough to allow the water to pass in flood times, it must be so wide that for long periods, in moderately dry weather, the water flows so shallow over its crest, that its indications cannot be relied on. To remove in some degree this objection, gauges for rivers or streams are sometimes formed, in the best engineering practice, with a small rectangular notch cut down below the general level of the crest of a large rectangular notch. If, now, instead of one depression being made, for dry weather use, in a crest wide enough for use in floods, we conceive of a large number of depressions, extending so as to give to the crest the appearance of a set of steps or stairs, and if we conceive the number of such steps to become infinitely great, we are led at once to the conception of the triangular instead of the rectangular notch. The principle of the triangular notch being thus arrived at, it becomes evident that there is no necessity for having one side of the notch vertical, and the other slanting; but that, as may, in many cases, prove more convenient, both sides may be slanting, and their slopes may be alike. It is then to be observed that, by the use of the triangular notch, with proper formulas and coefficients, derivable by due union of theory and experiments, quantities of running water from the smallest to the greatest, may be accurately gauged by their flow through the same notch. The reason of this is obvious from considering that, in the triangular notch, when the quantity flowing is very small, the flow is confined to a small space admitting of accurate measurement; and that the space for the flow of the water increases as the quantity to be measured increases, but still continues such as to admit of accurate measurement.

Farther, the ordinary rectangular notch, when applied for the gauging of rivers, is subject to a serious objection from the difficulty or impossibility of properly taking into account the influence of the bottom of the river on the flow of the water to the notch. If it were practicable to dam up the river so deep that the water would flow through

* From the Journal of the Society of Arts, No 311.

the notch as if coming from a reservoir of still water, the difficulty would not arise. This, however, can seldom be done in practice; and, although the bottom of the river may be so far below the crest as to produce but little effect on the flow of the water when the quantity flowing is small, yet when the quantity becomes great, the "velocity of approach" comes to have a very material influence on the flow of the water, but an influence which it is usually difficult, if not impracticable, to ascertain with satisfactory accuracy. In the notches now proposed, of triangular form, the influence of the bottom may be rendered definite, and such as to affect alike (or, at least, by some law that may be readily determined by experiment) the flow of the water when very small, or when very great, in the same notch. The method by which I propose that this may be effected, consists in carrying out a floor, starting exactly from the vertex of the notch, and extending both up-stream and laterally, so as to form a bottom to the channel of approach, which will both be smooth and will serve as the lower bounding surface of a passage of approach, unchanging in form, while increasing in magnitude at the places, at least, which are adjacent to the vertex of the notch. The floor may either be perfectly level, or may consist of two planes, whose intersection would start from the vertex of the notch, and, as seen in plan, would pass up stream perpendicularly to the direction of the weir board; the two planes slanting upwards from their intersection more gently than the sides of the notch. The level floor, although theoretically not quite so perfect as the floor of two planes, would probably, for most practical purposes, prove the more convenient arrangement.

With reference to the use of the floor, it may be said, in short, that by a due arrangement of the notch and the floor, a discharge orifice and channel of approach may be produced, of which (the upper surface of the water being considered as the top of the channel and orifice,) the form will be unchanged, or but little changed with variations of the quantity flowing; very much less, certainly, than is the case with rectangular notches. The laws regulating the quantities of water flowing in such orifices as have now been described, come naturally next to be considered. Without, however, in the present interim report, attempting to enter on a detailed discussion of theoretical considerations on this subject, I shall here merely advert briefly to the principal results and methods of reasoning.

By theory I have been led to anticipate that the quantity flowing in a given notch should be proportional or very nearly so, to the $\frac{5}{2}$ power of the lineal dimensions of the cross section of the issuing jet, or to the $\frac{5}{2}$ power of the head of water over the vortex of the notch. This head is to be understood, in the case of water flowing from a still reservoir, as being measured vertically from the level water surface in the reservoir down to the vertex of the notch; or in the case of water flowing to the notch with a considerable velocity of approach over a floor arranged as above described, the head is to be considered as measured vertically from the water surface, where the motion is nearly stopped by the weir board at a place near the board, but as far as may be found

practicable, from the centre of the notch. The law here enunciated, to the effect that the quantity flowing should be proportional to the $\frac{5}{2}$ power of the head, I consider should hold good rigidly in reference to water flowing by a triangular notch in a thin vertical plate, from a large and deep reservoir of still water, if the water were a perfect fluid, free from viscidity and friction, and from capillary attraction at its surface, and from any other slight disturbing causes that may have minute influence on the flow, the flow being supposed to be that due simply to gravitation resisted by the inertia of the fluid. The like may be said of water flowing from triangular notches with shallow channels of approach, having floors as described above, when due attention is given to make the passages of approach so as really to remain unchanged in form for a sufficient distance from the notch, while increasing in magnitude as the flow increases (such being supposed according to my theory to be possible), and if due attention be paid to the measuring the heads in all cases in positions similarly situated with reference to the varying dimensions of the issuing streams.

In illustration of these statements, or suppositions, I would merely say, that, if two triangular notches, similar in form, have water flowing in them at different depths, but with similar passages of approach, the cross section of the two jets at the notches may be similarly divided into the same number of elements of area; and that the areas of the corresponding elements will be proportional to the squares of the lineal dimensions of the cross sections; or, as from various considerations may readily be assumed proportional to the squares of the heads; also the velocities of the water in the corresponding elements may be taken as proportional to the square roots of the lineal dimensions, or to the square roots of the heads. From these considerations, supported by numerous others, it appears that the quantities flowing should be proportional to the products of the squares of the heads into their square roots, or to the $\frac{5}{2}$ power as already stated.

The friction of the fluid on the solid bounding surfaces of the passages of approach, where the water moves rapidly adjacent to the notch, may readily be assumed from all previous experience in similar subjects, not to have a very important influence even on the absolute amount of the flow of the water; and if we assume (as is known to be nearly the case for high velocities, such as occur in notches used for practical purposes, unless usually small) that the tangential force of friction of the fluid per unit of area of surface flowed along, is proportional to the square of the velocity of flow, it follows by theory that the friction, though slightly influencing the absolute amount of the flow, will not, according to that assumption, at all interfere with its proportionality to the $\frac{5}{2}$ power of the head. And this condition will very nearly hold good if the assumption is very nearly correct.

How closely the theory thus briefly sketched may be found to agree with the actual flow of water, will be a subject for experimental investigation; and whatever may be the result in this respect, the main object must be to obtain for a moderate number of triangular notches of different forms, and both with and without floors at the passage of

approach, the necessary coefficients for the various forms of notches and approaches selected, and for various depths in any one of them, so as to allow of water being gauged for practical purposes when in future convenient, by means of similarly formed notches and approaches. The utility of the proposed system of gauging, it is to be particularly observed, will not depend on a perfectly close agreement of the theory described with the experiments; because a table of experimental coefficients for various depths, or an empirical formula slightly modified from the theoretical one, will serve all purposes.

To one evident simplification in the proposed system of gauging, as compared with that by rectangular notches, I would here advert, namely, that in the proposed system the quantity flowing comes to be a function of only one variable, namely, the measured head of water, while in the rectangular notches it is a function of at least two variables, namely, the head of water and the horizontal width of the notch, and is commonly, also, a function of a third variable very difficult to be taken into account, namely, the depth from the crest of the notch down to the bottom of the channel of approach; which depth must vary in its influence with all the varying ratios between it and the other two quantities of which the flow is a function.

The proposed system of gauging also gives facilities for taking another element into account, which often arises in practice, namely, the influence of back water on the flow of the water in the gauge, when, as frequently occurs in rivers, it is found impracticable to dam the river up sufficiently to give it a clear overfall free from the back or tail water. For any given ratio of the height of the tail water above the vertex of the notch, I would anticipate that the quantities flowing would still be, approximately at least, proportional to the $\frac{5}{2}$ power of the head as before, and a set of coefficients would have to be determined experimentally for different ratios of the height of the tail water above the vertex of the notch.

With the aid of the grant placed at my disposal by the Association at last year's meeting, for the purpose of these researches, I have got an experimental apparatus constructed and fitted up at a place a few miles distant from Belfast, in Carr's Glen, on the grounds of Mr. Neeson, who has kindly afforded me all the necessary facilities regarding the water supply and the site for the experiments, and I have got some preliminary experiments made on a right-angled notch in a vertical plane surface, the sides of the notch making angles of 45° with the horizon, and the flow being from a deep and wide pool of quiet water, and the water thus approaching the notch uninfluenced by any floor or bottom. The principal set of experiments as yet made were on quantities of water varying from about two to ten cubic feet per minute, and the depths or heads of the water varied from two to four inches in the right-angled notch.

From these experiments I derive the formula $Q = 0{\cdot}317\ H^{\frac{5}{2}}$, where Q is the quantity of water in cubic feet per minute, and H the head as measured vertically in inches from the still water level of the pool down to the vertex of the notch. This formula is submitted at present tem-

porarily, as being accurate enough for use for ordinary practical purposes, for the measurement of water by notches similar to the one experimented on, and for quantities of water limited to nearly the same range as those in the experiments; but as being, of course, subject to amendment by more perfect experiments extending through a wider range of quantities of water.

Out of the grant of £10 from the Association for these experiments, the amount for which I have hitherto had to apply to the treasurer as having been expended in them is £8 0*s.* 4*d.*, which leaves a balance remaining of £1 19*s.* 8*d.*

It will be readily observed that the experimental investigations indicated in the foregoing report as desirable, are such as would require for their completion and extension to large flows of water a great expenditure both of time and money, like as has already been the case with researches on the flow of water in rectangular notches. All that I can myself, for the present, propose to attempt is to open up the subject with experiments on moderately small flows of water; and with this view I would be glad to be aided by a further grant from the Association in continuing experiments of the kind already undertaken.

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*Experiments on the Substitution of Coal for Coke in Railway Locomotives.**

That the consumption of smoke in coal-burning locomotives may be accomplished in a satisfactory manner was proved by experiments made some time since by Mr. Joseph Beattie, the talented manager of the London and South-Western Railway Company. In this case the invention made use of has received the approval of competent judges, and it has been patented, but it is stated there is one objection to its general employment. An expenditure of about £300 is required to adapt it to any engine previously in use, and on this account its employment has been confined to the new locomotives constructed. Assuming the duration of a locomotive to be from twenty to thirty years, a long time would elapse before the entire stock of a railway company would consist of engines so contrived. The directors of the Lancashire and Yorkshire and East Lancashire Companies have recently been aiming to accomplish the object by simpler and more direct means. The lines under the control of the two boards are nearly 400 miles in length, they employ about 300 locomotives, and the saving to be effected by using coal instead of coke would be at least £30,000 per annum. Mr. Jenkins and Mr. Lees, the locomotive superintendents of the two companies, have each perfected inventions which are exceedingly simple and inexpensive. That of Mr. Lees (of the East Lancashire) was put to the test on the 6th ult., on the railways between Manchester and Blackpool.

The distance from Manchester to Blackpool is 48 miles, and the 96 miles of line there and back was well adapted for a fair trial of the

* From the London Civ. Eng. and Arch. Jour., October, 1858.

invention. In going either way there are some severe gradients to ascend; two of them near Chorley, are as steep as 1 in 100; and there are also several sharp curves. For the purpose of the experiment a train was composed of fourteen or fifteen wagons loaded with old metal, two first-class carriages, and two break vans. The length of the train was 240 yards: its weight was estimated at 271 tons 15 cwt., including the engine and tender, which, when filled with coal and water, would be 41 tons 8 cwt. This is rather in excess of the average weight of ordinary luggage trains of thirty to thirty-four wagons. Mr. Fothergill, C. E., of Manchester, had charge of the experiment.

One of the main tests being to ascertain the economy of consumption, it was necessary to weigh the fuel upon the tender before commencing the journey. In this was included the quantity used for getting up the steam. For the same reason, on the return of the train, it was requisite to ascertain the quantity left in the tender and unconsumed in the fire-box. By deducting the latter items it was of course easy to calculate the net consumption and the cost per mile. Another important point was to see that the steam was kept as nearly as possible at an even pressure during the trip, and that to save fuel time was not lost in ascending steep gradients. Any delay of this kind would have to be compensated by great speed on more favorable parts of the line; and such irregularities might be a fruitful source of accident if allowed in the working of the ordinary traffic.

The train left the Salford station soon after twelve o'clock; and the journey to Bolton, a distance of 10 miles, and a rather heavy ascent, was made in thirty-five minutes. The distance from Bolton to Preston, 20 miles, was run in 43 minutes, and the remaining 18 miles in sixty-three minutes. The return journey occupied a much longer time, through detentions caused by trains being in the way, by rain having made the rails slippery, and other circumstances adverse to the experiment as regards economy. The results of the trip, however, were most satisfactory, the total consumption of coal being only about 39 cwt. for the whole journey. The coal used was that of the Ince-hall Company, at Wigan, costing 5*s*. 3*d*. per ton, and hence, the cost of the trip was about 10*s*. From experiments previously made, it appeared that with coke, which costs from 11*s*. to 11*s*. 6*d*. per ton, the expense of taking the train the same journey would have exceeded 20*s*. In two previous trials made by Mr. Fothergill—one with coal and the other with coke—over the same line, weather and circumstances being equally favorable to each, the cost was 9*s*. 5*d*. for the experiment with coal, and 22*s*. 3*d*. for that with coke. There seems to be no doubt therefore of the advantage of using coal in point of economy.

As regards the smoke-burning apparatus, the experiment was also highly satisfactory. The great desideratum is the proper admission of atmospheric air into the fire-box, and Mr. Lees secures it in a very simple and inexpensive manner. In the lower part of the fire-box door an opening is effected by an adjustable plate, and the admission of air can be regulated as desired. Inside the door is a hood, closed at the top over the aperture, and it acts as a deflecting plate to the air when admitted,

and forces it down upon the fire. Nearly at the further end, the fire-box is arched over with fire-bricks or tiles. The effect of the brick arch is, that on becoming red hot, it throws back the products of combustion, and thus causes a better mixing of the gases. If more desirable, the arch or mid-feather might be constructed of copper, with a water-space, so as to increase the heating surface of the boiler. The cost of the whole apparatus is only a few pounds per engine, and a sum of about 20*s.* per annum will be sufficient to keep each of them in repair. The directors of the East Lancashire Company have been so satisfied with its efficiency, that they have adopted it all but universally,—only two of their locomotives being now without it.

After careful observation throughout the journey, it was the general opinion that there was no smoke emitted from the chimney that could be considered a nuisance, or any thing approaching to a nuisance, by passengers or the public. There was occasionally a slight discoloration of the steam when more coal was added to the fire than is usually applied at one time, and the same is the case with coke; but the effect disappeared in a moment or two, and "the light and graceful steam cloud," as it has been termed, was left floating over the train as pure and white as it is ever witnessed during the consumption of coke. In some respects passengers will have occasion to rejoice at the change, for the little smoke that does from time to time escape unconsumed, when beaten down and confined in a narrow space by passing under a bridge or through a tunnel, is less sulphurous than coke: nor is it accompanied by such a cloud of small, sharp, blinding particles. If it could become offensive any where, it might be supposed to be so when the train comes to a stand in the large enclosed stations, and when the steam is shut off; but a contrivance, by which a jet of steam is thrown into the chimney during such stoppages, so nearly dissipates it, or prevents its formation, that the small quantity emitted is scarcely perceptible.

The wear and tear of fire-box and tubes is much lessened by the use of coal. In burning coke a large amount of sulphur is given off, which leaves a thick crust upon the tubes. This becomes so troublesome and destructive that engine-drivers are compelled to cleanse them at least once a day, and sometimes even more frequently. Such incrustation cannot be removed without more or less injury to the metal; and the sharp hard particles given out by coke fires, and drafted up the tubes, have the effect of cutting and wearing them away, especially at the edges. In burning coal the sulphur is supposed to pass off in a more volatile form, there is little or no incrustation, but the metal is found instead to be lubricated with a soft oily matter, which requires to be removed only about once a week. The economy in this respect will no doubt be considerable. During the experiments it was stated by Mr. Fothergill that the average duration of a set of tubes with coke would not exceed 94,000 miles; while with coal he had seen a set in use, and apparently not half worn out, after traveling 156,000 miles. The average with coal would probably reach 300,000 miles.

The best kind of fuel yet tried during the experiments to the present

time is said to be the Horbury coal. An experiment with Welsh smokeless coal entirely failed,—the bars of the fire-box getting clinkered over, so that the engine could not proceed.

On the following day an experimental trip was made over the same line of rails with the same train, but drawn by a locomotive having the smoke-burning apparatus invented by Mr. Jenkins, of the Lancashire and Yorkshire Company. This invention, which has been generally adopted by that company, is rather more expensive in its application than that of Mr. Lees, though still of very small cost; it is also very effective. Mr. Jenkins admits atmospheric air into the fire-box through a number of tubes in front of the fire-box and underneath the boiler. The outer part of the fire-box is furnished with a sliding plate, which can be worked by the engine-driver at pleasure, so that during the time of adding fresh fuel to the fire, by moving the plates the tubes are uncovered, and a good supply of oxygen is insured. He has also a perforated deflecting plate across the fire-box, to insure a better combustion of the gases, and prevent the escape of unconsumed carbon.

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*The Suez Canal Project.**

In the course of November next, says the *Daily News*, a general meeting will be held in Paris for the purpose of establishing a company for finally carrying out the project of the Isthmus of Suez Canal. The capital is said to have been nearly all subscribed in the following proportions:—

The Viceroy of Egypt,	£1,280,000
Turkey, Egypt, and Syria,	840,000
France,	1,600,000
Austria and Lombard Venetian,	800,000
Russia,	480,000
North of Germany, Sweden, Denmark, Hanseatic Towns, Prussia, Switzerland, Holland, and Belgium,	600,000
Spain, Portugal, Italy and Greece,	400,000
United States of America,	400,000
Leaving the portion reserved for England,	1,600,000
	£8,000,000

The whole capital to be represented by 400,000 shares of £20 each.

A New Method of Road-Making.†

The everlasting noise which is occasioned by the rugged material of our English roads, and the frequency of their being under repair, gives especial value to a fact which we find in the French papers. A new system of road-making has just been substituted for the ordinary roadway on a part of the Place du Palais Royal. A quantity of con-

* From the London Builder, No. 8 6.

† From the London Mechanics' Magazine, Oct., 1858.

crete, about 5 ins. in thickness, is first spread out, and on that is applied a layer of bitumen reduced to powder and in a boiling state. On this latter, which is also about 5 ins. in thickness, a quantity of river sand is sifted, and then the surface is pressed down by a heavy cast iron roller, weighing about two tons. In a few hours after, the road thus made may be passed over by the heaviest wagons without the slightest impression being left by the wheels. The same system is now being applied to part of the Rue St. Honoré comprised between the Palais Royal and the Rue de Richelieu, and in the latter street as far as the end of the Théatre Français.

Collapse of Flues.

The question of the resistance of thin tubes to collapse has recently occupied the attention of practical men; and some important facts, hitherto unremarked, or but partially investigated, have been brought to light. Mr. Fairbairn finds that the intensity of the pressure required to make a flue or other thin tube collapse, is directly as the square of the thickness, nearly inversely as the diameter, and *inversely as the length*. The diminution of the strength of a flue, as the length increases, is a law never before, it would appear, suspected. For computing the pressure in pounds on the square inch which a wrought iron flue can sustain, the following rule is sufficiently near the truth for practical purposes:—Multiply the constant factor 806,000 by the square of the thickness, in inches; and divide by the product of the length in feet, and diameter in inches. It is of great importance to strength that the flue should be as cylindrical as possible.—*London Artizan, Dec.*, 1858.

Experiments on Propellers.

In a former number of the *Journal*, we described a new propeller invented by Lieut. Vergne, the characteristic of which was the fluting or ribbing of the surface (*Journ. Fr. Inst.*, 3d Series, vol. xxxv., page 299). At the meeting of the Paris Academy of Sciences, 25th of October, 1858, M. Clapeyron presented the results of some experiments made with it.

Experiments on Le Vigilant.—The mean economy of fuel showed a gain in favor of the Vergne propeller of 17 per cent. The velocity was greater by more than half a knot, or 6 per cent. The new propeller turns more easily. The disturbance of the water near the stern disappeared; the wake was as smooth as that of a sailing vessel, and the whirlpool from the propeller appeared only at a distance of 7 or 8 metres astern.

Experiment on L'Austerlitz, reported by Lieut. Loyer.—With the former propeller the engines gave but 42 turns; the shaking disordered

(*fatigued*) the engines; now the apparatus turns with ease and remarkable regularity, so that we shall gain by increasing as much as possible the number of turns. The maximum speed obtained is 9 knots under all sail, and making 43 turns. We have frequently had 8 knots in a calm, and with 12 furnaces lighted, out of 20. The wake of the vessel is as smooth as that of a sailing vessel, and we remarked no shaking. At night, by means of the phosphorescence, we could trace the water thrown from the propeller; it was seen to be driven directly astern parallel to the keel, and with a helicoidal form.

Trip from Cherbourg to Brest.—The *Austerlitz* made 9 knots with 47 or 49 turns. Last year, the *Ulm*, of 650 horse-power, made much better time than the *Austerlitz*, whose engine is only 500 horse-power. Upon this trip the two vessels sailed at the same time, and excepting some little oscillations, sailed the whole time in company. With common coal, the log of the *Austerlitz* recorded 10 knots, while the helix made 50 and 51 turns, without any shaking.

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*On Boiler-plate Joints.**

In the discussion of boiler-plate joints, Mr. Clark demonstrates that the bursting strain on the longitudinal seams of cylindrical boilers is double the strain on the circular seams. This is an important practical distinction, because it is clear that, to ensure uniform working strength, the longitudinal seams must be doubly fortified; and, in the consideration of the means of soldering, four distinct kinds of riveted joints are compared, and their relative strengths determined from actual trials. Welded joints are likewise discussed, and should the reported results of their capabilities to resist bursting strains be corroborated by advanced experience, they promise to supersede riveting, if not entirely, at all events for the principal joints. In the order of tensile strength the joints are ranged thus:—

1. Scarf-welded joint,	100	
2. Double-riveted double-welt joint,	80	per cent.
3. Double-riveted lap-joint,	72	"
4. Lap-welded joint,	66	"
5. Double-riveted single-welt joint,	65	"
6. Single-riveted lap-joint,	60	"

In this comparative statement the strength of the entire plate is represented by 100; and the trials were made with plates varying from $\frac{3}{8}$ to $\frac{1}{2}$-inch in thickness. The relative strengths of single and double-riveted joints do not very materially differ from those deduced by Mr. Fairbairn.

* From the London Artizan, December, 1858.

AMERICAN PATENTS.

List of American Patents which issued from November 2 to December 7, 1858, (inclusive,) with Exemplifications.

NOVEMBER 2.

1. Method of Hanging Swords; Jonathan Ball, Utica, New York.

Claim—The arrangement and combination of the scabbard, plate, and bit-pin, with the belt or sash plate, as described.

2. Mechanism for Transmitting Rotary Motion; Gerard Bancker and Andrew Campbell, City of New York.

Claim—The use of the combination of the sliding clamping block and extension rod, with the double-acting clamping lever, made in the manner set forth.

3. Saw Gummer; Nelson Barlow, City of New York.

Claim—The arrangement of levers, C and D, rests, E and F, in combination with the milling cutter and clamp, as set forth.

4. Trucks for Locomotive Engines; Levi Bissell, City of New York.

Claim—The rigid truck frame attached to the engine by the bolt or pin, and receiving one pair of truck wheels, in combination with the double inclined bearings, for the purposes specified.

5. Tool for Chamfering Leather Straps; James Bridger, Richland, Iowa.

Claim—The tool described for chamfering and channeling leather straps.

6. Stoves; J. H. Buchanan, New Concord, Ohio.

Claim—The arrangement, consisting of the concave bed or ash-pit of larger diameter than the grate, and constructed with supporting lugs or ledges, semi-spherical open top grate or fire chamber, with draft space existing between it and the ash-pit or bed, and flaring stove-pipe, appearing as a continuation of the grate, and furnished with a transverse feed and draft door, and arranged above the fire grate, and made adjustable in a vertical line with the fire grate on a vertical standard, as set forth.

7. Gate Hinge; C. E. Burnham, Binghampton, New York.

Claim—The pintles placed within the sockets that are attached to the ends of the gate, in connexion with inclined planes and steps attached to the posts, the spring acting or bearing on the pintles, and the levers, or their equivalents, connected to the pintles through the medium of the rods and arms, as described.

8. Raking Attachment to Harvesters; W. W. Burson, Yates City, Illinois.

Claim—1st, The transverse hinging of frame for elevating the rake as it moves to the rear. 2d, Adjusting the rake in its position for starting by the gravity of the gear portion of the raking mechanism, combined with the transverse hanging of the frame, the operation being as described. 3d, The combination of the tilting platform, stubble leveler, and glancing board, with the rake for collecting and delivering the cut product. 4th, The combination of shaft, cam-wheel, spring, and slotted step, as set forth.

9. Arithmometer for Addition; O. L. Castle, Upper Alton, Illinois.

Claim—1st, Combining the shaft of the driving-wheel, which serves to give motion to the register, with the keys, by means of a series of ratchet-wheels on the said shaft, and a series of levers of different lengths which work on said shaft as a fulcrum, and are connected with the keys, when the whole are arranged as set forth. 2d, Combining the register wheels of lower denomination with those of higher denomination, by means of the pawls, ratchet-wheels, and stationary plates. 3d, The springs with their elastic arms, applied to the register wheels, in combination with the stationary plates and their projections, to operate substantially as set forth.

10. Railroad Ditching Machine; Wm. Chadwick and S. J. B. Anderson, Terre Haute, Indiana.

Claim—The levers, 2 4 7 and 9, arranged on a car, for holding the scoops at the side of the car, and for adjusting or raising and lowering them, as required. Also, the levers, 1 3 5 6 8 and 10, arranged on a railroad car for operating the scoops so as to catch their load of earth, and for dumping them as required. Also, the scoops, made so that they may be worked either end forward, the same side up to be filled. Also, the vibrating mouth-piece hinged to the scoop, so as to be vibrated substantially as described.

11. Car Axle Boxes; John W. Cochran, City of New York.

Claim—1st, The sliding collar, constructed and arranged upon the axle and in relation to the packing of the box, as set forth. 2d, The arrangement of the lubricator, door, disks, packing, follower, and bolts, whereby the whole may be adjusted to the bearing brasses, as set forth.

12. Machine for Cutting Corks; Edward Conroy, Boston, Massachusetts.

Claim—1st, The combination and arrangement of the sliding plate, V, sliding plate and spring or pointers, W, in front of the same, vibrating angular lever, Y, and cams, a a, on inclined revolving shaft, P2, partly cogged wheel, R, and spring arbor or shaft, T, for placing and securing the rough pieces of corks to be cut between the pointed end of the said arbor or shaft, T, and correspondingly pointed revolving hub, U'. 2d, The combination of the cam, K, secured to the top of the frame, A, and curved spring, J, with the sharpening device, G, and rotating cutter plate, H, for sharpening the cutters after they have cut the cork, and are in the act of being again withdrawn, and moved toward the arbor or shaft, T. 3d, The combination of the cam, o3, and friction roller, b, with the sliding frame, B, as set forth.

13. Grain Separators; William R. Cox, Delphi, Iowa.

Claim—The spouts, provided with the deflectors connected by the trough, and arranged relatively in respect to each other and to the spout and trunk, substantially as set forth. Further, in combination with the above, the loaded valve applied to the trunk, and used in connexion with the spouts, for the purpose specified.

14. Bank Locks; Lyman Derby, City of New York.

Claim—1st, The use of the bars or cross-bars secured on an axis eccentric to its true centre, for the purpose of obtaining gravity to unlatch them, in combination with the inside of the door of a safe or other place.

2d, The use of a pendulous latch lever, secured to the inside of a safe, in combination with the bars or cross-bars operating on the inside of the door of a safe. 3d, The use of the application of a clock-work movement, in combination with an inverted Y-shaped pendulous latch lever and bars or cross-bars, on the inside of the door of a safe, for the purposes set forth.

15. MANUFACTURING STEEL; Joseph Dixon, Jersey City, New Jersey.

Claim—The process of making steel by heating pig or cast iron, covered or stratified by any substance which will preserve a separation of the plates or pieces of iron through the process of heating, except so far as the use of oxide of iron as a separating material by any patent referred to.

16. HARPOON; George Doyle, Provincetown, Massachusetts.

Claim—1st, Attaching the shank of the harpoon to the head, so that when the latter turns in the fish, the flat side instead of the edge shall be presented to the resisting body. 2d, The slots and lip, operating substantially as set forth.

17. TACKLE BLOCKS; John Ferrier, Charlestown, Massachusetts.

Claim—Placing two rows of pulleys in each block, the axis of one row being at right angles to the axis of the other, and the rope passed or adjusted around the pulleys, as set forth.

18. GAS-FITTERS' VISE; Joseph S. Ford, Philadelphia, Pennsylvania.

Claim—The upper die and lower die, in combination with the screws, the said dies having two or more semi-circular recesses, situated in respect to each other and to the screws substantially as set forth.

19. CAR SPRINGS; Perry G. Gardiner, City of New York.

Claim—As my invention the following named improvements and features in the conical coiled steel spring, viz:—1st, Its construction out of a plate or bar not thinned, slotted, or hammered out at the ends, which is to constitute the apex of the spring. 2d, Nicking or compressing the face of the plate (as shown at the line) without breaking or cutting the fibre of the metal, for the purpose described.

20. PLOUGHS; John Gehr, College of St. James, Maryland.

Claim—The hollow corrugated roller, in combination with the mould-board, brace, and guard, arranged substantially in the manner set forth.

21. STRAW CUTTERS; Oliver C. Green, Dublin, Indiana.

Claim—The described arrangement of the hinged connecting rod, lever, spring, pin, sliding gate, and oblique knife, with the V-shaped knives at the end of the trough.

22. JOINT FOR T-RAILS; Wm. Harvey, Albany, New York.

Claim—The arrangement and combination of the laterally tongued side plate with the rails, chair, and side piece, as described.

23. RAILROAD CHAIRS; P. F. Hall, Troy, New York.

Claim—The combination of the plates, b b c, and lips or jaws, a and c, together with the draw bore spiking of the same, by which they are keyed and also wedged and fastened to the tie by one operation, as specified.

24. SEEDING MACHINES; Aaron Hatfield, Petersburg, Illinois.

Claim—The arrangement of the seed hoppers represented, in combination with the mechanism for driving the seed slides and dropping the grain or seeds, and covering them as described.

25. DRINKING CUP; Louis Grosholz, Philadelphia, Pennsylvania.

I do not desire to confine myself to the employment of three sections, inasmuch as two might be used for a small sized cup, and for those of a larger size, four or five sections might be advantageously employed.

Claim—A drinking cup formed of two or more sections with inclined sides, said sections being adapted to, and detachable from, each other, substantially as set forth.

26. SEEDING MACHINES; Wm. Y. Henry, Monmouth, Illinois.

Claim—Connecting or arranging the levers or rods of the pestles or weights, and the levers of the tubes, when used in combination with the wheels connected with the slide, and the whole arranged to operate as set forth.

27. TAP FOR CUTTING WOODEN SCREWS; W. O. Hickok, Harrisburg, Pennsylvania.

Claim—Making screw-threads around the outer surface or periphery of the cylindrical projection, so that they shall operate in the manner and for the purpose described, the said projection being made slightly larger than the hole in the wood in which the required screw is to be cut.

28. DIE FOR CUTTING WOODEN SCREWS; W. O. Hickok, Harrisburg, Pennsylvania.

Claim—The reduced sectional thread, in combination with the first cutter, when the same is made to operate in the manner set forth.

29. IMPROVED LOCK AND KEY; Joseph Hoffacker, City of New York.

Claim—1st, Constructing a lock which is closed or locked by the bolt shooting forward and upward, and which is opened or unlocked by a screw-key urging the bolt downward and backward. 2d, The construction of the bolt, in combination with the barrel and three springs. 3d, The combination of the door handles with the lever. 4th, The construction and operation of the screw-key, substantially as described.

30. THRESHING MACHINES; Abram Jackson, Lebanon, Tennessee.

Claim—The arrangement of the band wheels upon the spokes of the wagon wheels in connexion with the hounds, substantially as described.

31. FILTERING COCK; Lemuel P. Jenks, Boston, and Francis Draper, East Cambridge, Massachusetts.

Claim—The combination and arrangement of a filtering cock, substantially as described, giving the optional transmission of the water through the filtering medium in either direction, or through the filtering case, the former without unnecessary impediment to the current, by one passage across the width of the filter from a rotating two-way cock placed by the side of the filtering medium, and closed or discharging at pleasure, the filtering case and the filtering medium being stationary.

32. SAUSAGE MACHINE; R. V. Jones, Johnstown, Pennsylvania.

Claim—The arrangement of flanched cylinder with a knife having hooked or V-shaped teeth, substantially as specified.

33. SHIELD PINS; Josee Johnson, City of New York.

Claim—Shielding the point of the pin within folds or coils when turned on both sides of the main stem, as described.

34. CAR SEATS; P. P. Joseff, Philadelphia, Pennsylvania.

Claim—The combination and arrangement of the slotted vertical bar, having grooved wheels on its face, cogged plate, pinions, radial arm, and wrist-pin or stud, projecting from the end of the movable seat bottom and jointed crank, in the manner described.

35. SASH FASTENER; Edward M. Judd, New Britain, Connecticut.

Claim—Attaching the rod to the spring by means of the grooves in said rod, the button at its end, and the hole and slot in the spring, substantially as set forth.

36. SEEDING MACHINES; H. Kaller, Perry, Illinois.

Claim—The cylinders provided with the seed cells, having the slides attached and arranged within the tubes, and relatively with the hoppers to operate as set forth.

37. STRAW CUTTERS; James Lashbrooks, Rockport, Indiana.

Claim—The two rollers provided with the circular toothed blades, in combination with the clearers, arranged to operate as set forth.

38. MINERS' RAILROAD TURN OR CIRCULAR SWITCH; E. B. Lowman, Bellair, Ohio.

Claim—The arrangement of the crossings, as seen at letters C, D, E, F, M, N, and L, fig. 1, together with its adaptation to the working of miners on either side of the entry, by reversing its position on the main stem.

39. MACHINE FOR SOLDERING; E. Manley, Marion, New York.

Claim—Arranging within and in the desired relation to the furnace, mounted on wheels, and constructed as set forth, an inclined copper bar or soldering tool, having notches on its lower surface, and a wedge or key above, for retaining it with the required degree of heat, in combination with the inclined conducting tube and hinged box, and its attachments divided into two compartments for the solder scraps and resin.

40. SMOKING TUBE; Charles Matthews, City of New York.

Claim—Arranging the tubes, C and E, with the mouth-piece, in such relation to each other that they form a compound smoking tube for smoking tobacco, or other substances, in a finely divided state. Also, closing the upper end of the tube, E, in such a manner that the same when inserted into the draft tube, C, and brought close up to the inner end of the mouth-piece, leaves a sufficient space for the passage of the smoke up through the central opening of the mouth-piece described. Further, constructing an ash-pan in such a manner that the same slides on the compound smoking tube by means of a loop, so that the ashes dropping from the lighted end of the tube are deposited in the ash-pan.

[This invention consists of two tubes of thin paper, one of which fits into the other, with barely space between for the passage of the smoke. The inner tube is closed at the bottom by an oblong piece of stiff paper bent over its end in the shape of a letter U, and contains the substance to be smoked in a state of fine powder. A firm and thick paper tube, from 1½ to 2 inches long, is fitted into one end of the outer tube, to serve as a mouth-piece, and also as a support for the inner tube—of which the closed end reaches and is fastened to it, but so as not to close it (viz: the mouth-piece,) entirely; the curved form of the end of the inner tube permitting the smoke to pass freely on either side of it. This compound tube, when filled, is twisted to a tapering end, which, when used, is inserted into the collar of the ash-pan, which is an oblong dish or pan, about 2½ inches long, of very light metal, in the form of a trough, having at one end a collar or loop of proper diameter and half an inch long. The object of this pan is to catch the ashes, and as the cigar burns away, the pan is made to slide along towards the mouth of the smoker.]

41. PLOUGHS; A. A. McMahen, Oxford, Mississippi.

Claim—In combination with a coulter having a brace and adjusting openings therein, a mould-board whose shank is made adjustable in the beam, so that said mould-board may be adjusted to the coulter and in the beam, as described.

42. PRESSES FOR EMBOSSING AND FIGURING VELVETS, &c.; John Nagle, Altoona, Pennsylvania.

Claim—1st, The application of steam to presses for figuring silks, velvets, and similar materials. 2d, The combination of rollers, A, B, B, C, with the wheels, r r, and chain, z. 3d, The double lever, in combination with the chain, H, and weight, W. 4th, The movable guide, in combination with the rollers, all in the manner described.

43. REFRIGERATOR; Benjamin M. Nyce, Kingston, Indiana.

Claim—1st, The employment of the fan, when arranged as set forth, for producing a circulation of the contained air, so as to bring it in immediate contact with the lime, or other dessicating composition, for the purposes specially set forth. 2d, The peculiar construction of the beam, T, that is to say, I claim the metal bar, X, the insulating beam, V, the trough, Y, and supporting beam, U. 3d, The partition, when arranged and operating substantially in the manner set forth.

44. TRAP FOR ANIMALS; R. L. Payne, Halifax, Virginia.

Claim—The arrangement of the separate balanced fingers in connexion with the box or body of the trap, as described.

45. TRIPPING BLOCK FOR BOAT DAVITS; Charles Perley, City of New York.

Claim—The tripping or disconnecting block, constructed as specified, and applied to davit blocks for boats or to other purposes, as set forth.

46. METHOD OF ADJUSTING THE PLUMMET WITHOUT MOVING THE TRIPOD IN SURVEYING INSTRUMENTS; Charles A. Saxe, Philadelphia, Pennsylvania.

Claim—The arrangement described for placing surveying instruments' centres over any point within the circle, K, without moving the legs of the instrument, and unscrewing the leveling screws, but by unscrewing the screws, C C, moving the ball plate, A, and revolving the ring, H, as described.

47. HAND PRINTING PRESSES; J N. Phelps, City of New York.

Claim—1st, The combination and arrangement of the radial pins on the transverse shaft and shoulder cams on the sides of the lever, oscillating arms, J, spiral springs, U, for moving the same automatically, and spiral springs for pressing the inking roller in contact with the printing rollers, Q R, when receiving the ink from the same, and in contact with the face of the type in the form secured to the under part of the platen. 2d, Arranging the inking rollers, Q R, in the relation to each other and to the inking roller, K, at the lower end of

the bars or arms, and the lower surface of the platen, when raised as described, and in combination therewith. 3d, The segmental shield or plate, so arranged in relation to them and the corresponding segmental formed arm or support, as to thoroughly protect the sheets of paper being imprinted, from contact with the said inking rollers, and enable its edges to be moved upward in the space between the shield or plate, and arm or support, substantially as described.

48. LIFTING HANDLES; Joseph B. Sargent, New Britain, Connecticut.

Claim—"A lifting handle" with the plate cast in any metal that can be bent, having the socket formed in the manner described, and operating in connexion with the handle, as specified.

49. HEMP BRAKES; William Shelby, Waverly, Missouri.

Claim—The arrangement of the beaters or blades at varying distances, in combination with the yielding plates, as described.

50. COMBINED BOOK AND SLATE; Forrest Shepherd, New Haven, Connecticut.

Claim—The combination of the slate with the book, when so connected and arranged that the slate can be used with equal convenience and facility with each page of the book, while the page and the slate are continually before the eye of the user, as represented.

51. CAR SEATS; John W. Sibbet, Cincinnati, Ohio.

Claim—Constructing every alternate seat in two distinct parts, and providing the upper detachable portions with guiding hubs at their ends, to which are attached straps or bands for elevating them, horizontal spring bars whose ends enter slots in the guide columns or posts for sustaining them, in conjunction with the straps or bands in their elevated portions, and combining with the said upper detachable portions and the permanent seats pieces of cushioned or stuffed cloth, or other material, capable of being packed in the boxes of the seats, the whole being constructed substantially as described.

52. RAILROAD CHAIRS; James H. Simmons, Painted Post, New York.

Claim—The construction of a chair raised in the centre for the ends of the rails to rest on, and sloping from near the centre toward each end of the chair, leaving a space between the rails and the chair over the sloped portion to accommodate the spring of the rails together with projections, as described.

53. CANDLESTICKS, &c.; Samuel Slocumb, Cambridge, Massachusetts.

Claim—A lamp stand having a metal socket, a glass shank, and a marble base, the whole being secured together by the rod, D, as set forth.

54. PREPARING WOOL AND OTHER FIBRES FOR SPINNING; Waterman Smith, Manchester, New Hampshire.

Claim—In the process of drawing wool and other fibrous substances, heating the sliver of wool, or other substance, and keeping it hot while it is being drawn, by passing it over or against, and in contact with, heated surfaces, either moving or stationary, substantially as described.

55. MACHINE FOR CREASING AND BLACKING LEATHER FOR HARNESS; Adolph Stempel, Oquaroka, Illinois.

Claim—The pressure rollers and the creasing and embossing rollers, in combination with the color fountains and felt rolls, the whole being arranged as set forth.

56. PEDAL ATTACHMENT FOR PIANOS; Wm. B. Stetson, Taylor, New York.

Claim—The construction and arrangement of the pedal chord bars, connecting suspension rods, and upper bars, and finger rods, and operated as described, in combination with key-board instruments, and whereby the corresponding harmony of any melody or air is produced simultaneously therewith by the performer, through the agency of the feet.

57. SAFETY APPARATUS FOR STEAM BOILERS; Francis Stebbins, Hinsdale, New Hampshire.

I am aware that it is not new to so combine a vessel with a boiler and an alarm or signal apparatus, that such vessel, when the water in the boiler may be above its lowest safe water level, shall be kept filled with water by the pressure of the steam, and when such water may fall below such level of safety, such vessel, by the entrance of steam into it, shall be emptied of its water, and thereby, by the abstraction of the weight of water from such vessel, the alarm or signal apparatus shall be put in operation, and therefore I do not claim such. Although I maintain this principle of operation in carrying out my invention, I effect an important and valuable improvement, as my invention rests on an improved mode or means of carrying out such principle, and consists in an arrangement of pipes with respect to the vessel and boiler, whereby the steam and water passages are entirely separate from one another, so that the water does not hinder or obstruct the passage of the steam from the boiler to the vessel, D, one not having to rush directly by, and in contact with, the other, while the steam may be flowing into the vessel, D, of the safety apparatus. Furthermore, my arrangement presents other advantages as by means of it the safety apparatus is entirely out of the boiler, and is not liable to be injuriously affected by the foaming of the water in the boiler.

Claim—The improved safety apparatus, as specified, or the above described arrangement of the two separate steam-pipes, the two separate water-pipes, and tubular shaft, together and with respect to the boiler, A, the vessel, D, and its loaded level, C, and so as to enable the whole to operate substantially as explained.

58. SPEED INDICATOR AND RECORDER FOR RAILROAD CARS; J. Dutton Steele and William Lorenzo, Pottstown, Pennsylvania.

Claim—The governor shaft and indicator, and the shaft carrying the prepared paper, in combination with the main driver, as described.

59. HARVESTERS; Charles T. Stetson, Amherst, Massachusetts.

Claim—Combining two double-edged cutting blades with each of the vibrating cutter shanks, for the purpose of reducing the number of joints in the cutting apparatus. Also, combining an inwardly extending curved arm with the inner end of the finger bar, when the vibrating end of said arm is made to play between guiding cheeks or in a guiding groove, and the said inner end of the finger bar is jointed to a vertically sliding head, substantially in the manner set forth.

60. LOCK; O. B. Thompson, Hudson, Ohio.

Claim—The tumblers, f, and guards, g, constructed, arranged, and placed in such relation with the plate, b, of the bolt tumbler, c, and slides, j, to operate as set forth. Also, in combination with the above parts, the bar, arranged so as to be acted upon by the arbor bit to adjust the tumblers, f, as the bolt, B, is shoved out from the case. Further, the plate, l, and buffer, m, placed at the back part of the slide chamber, E, substantially as set forth.

61. SEEDING MACHINES; Joseph Walton, Delavan, Wisconsin.

Claim—The rotary disk, in combination with the throat, the partition, the valve, the finger, and the grass seed hopper, when the whole are arranged as set forth.

62. CAR BRAKES; J. N. Ward, Brooklyn, New York.

Claim—The combination of the pulleys and brakes, together with the mode of operating the same, the whole being constructed and arranged as specified.

63. SELF-INKING HAND PRESS; Daniel Zuern and L. L. Bevan, Shamokin, Pennsylvania.

Claim—The combination of the arm or lever, G, with the shaft, H, the crank, I, and the vertical revolving shaft, J, and the connexion of shaft, J, with the revolving arm, K, thereby accomplishing a double action, viz: first, upon the ink roller, D; second, upon the movable bed, E, for the reception of card or paper to be stamped or printed—by down vertical pressure of lever, A, roller, D, moves horizontally over ink sponge, F, and in contact with it. Also, the combination of finger, d, with hook, e, on movable bed-plate, with the mode of adjustment and disconnexion, for the purpose of effecting movement of movable bed-plate, E, and also the movable bed-plate, E, for the purpose substantially as set forth. But we do not claim any other part or portion of the machine as new, or of our invention.

64. AXLE BOXES; Henry Howson, Assignor to Isaac P. and Jacob L. Wendall, Philadelphia, Pennsylvania.

Claim—The combination of the box with the bearings, B and B′, and retaining keys, C and C′, when the interior of the box is arched on the top, when the said arch terminates on each side of the recesses, g g, formed in the sides of the box, when the keys are adapted to fit into the recesses and against the edges of the bearings, and when the several parts are arranged in relation to each other, substantially in the manner and for the purpose set forth.

65. WEIGHING CARTS; James W. Martin, Assignor to Lewis Rothermel, Philadelphia, Pennsylvania.

I do not claim the application of a scale beam to a cart, for the purpose specified, for this has been formerly done, and may be seen in the device patented by me, and formerly alluded to.

Claim—The shaft, E, provided with hooks, d d, and arms, e e, which are connected by rods, f f, with lever, h, having their fulcra, i, connected by pendants, j, to the arms, k, of a shaft, l, which is connected with the scale beam, G, by the arm, o, and rod, a, the rods, q, of the body resting on the lever, h, when the latter raises the body, and the latter provided with the rod, c, for the hooks, d, to catch over, the whole being arranged substantially as set forth.

66. PADLOCKS; E. M. and J. E. Mix, Assignors to selves and C. D. Johnson, Ithaca, New York.

Claim—The combination of the curved or bent tumblers, a, and dog, D, provided respectively with springs, c k, and arranged relatively with the bolt or shackle, B, to operate as set forth.

67. BILLIARD TABLE; Daniel D. Winant, City of New York, Assignor to William R. Winant, Brooklyn, New York.

Claim—1st, Constructing the beds of billiard tables of slabs of glass, substantially as specified. 2d, The clips, c c, taking the beveled edges of the slab to retain the same, as described. 3d, The block, e, receiving the screws, g, of the cushion rail, as described.

68. MECHANICAL MOVEMENT; Joseph H. Davis, Woburn, Massachusetts.

Claim—The arrangement set forth for transmitting power from any prime motor to a propelling gear or wheel, viz: through the intervention of a series of curved or bent and weighted arms, said arms working together and connected to the gearing at their ends, substantially in the manner set forth.

69. RUDDER FOR VESSELS; Silas Yerkes, Jr., Assignor to self and George Yerkes, Philadelphia, Penna.

Claim—The gearing of the outer or aftermost of the two hinged portions of the rudder with a fixed gear or toothed arc attached to the vessel, substantially as specified.

[This rudder is made in two parts, called by the inventor the "main rudder" and "outside rudder." The former is hinged in the same manner as a common rudder, to the stern-post of the vessel, and the other one is hinged in a similar manner to the back of the fast one, and has secured to it a concentric toothed gear, which gears with a stationary toothed arc, concentric with the first one. The main rudder is operated in the usual way, and by its action the outside one is caused, by the arc and gear, to move faster in the same direction, and the two combined produce a greater effect on the water by a given movement of the steering apparatus than a single rudder presenting the same area of surface.]

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70. KNITTING MACHINES; Walter Aiken, Franklin, New Hampshire.

Claim—The peculiar shaped cam groove, constructed as described. Also, the selvage fingers, as described.

71. REVOLVING FIRE ARM; Ethan Allen, Worcester, Massachusetts.

Claim—1st, Forming the stud or pin to support the tumbler and hammer solid with the case or frame, when the hammer is placed outside the case, as described. 2d, The cam surfaces of the tumbler and piece, I, or their equivalents, to rotate the cylinder, by means of the piece, M, in the manner set forth.

72. FLOUR COOLERS; Horace B. Allis, Little Rock, Arkansas.

Claim—The combination with a cooler hung so as to revolve upon a nearly horizontal shaft of nearly radial screens; and also the combination therewith, as an auxiliary to accomplish the desired result, of the solid flanches for checking the motion of the meal till the screens have arrived at the proper angle to properly distribute the meal.

73. SEWING MACHINES; Otis and Zelotes W. Avery, Bethany, Pennsylvania.

Claim—The combination of the rocker or yoke, pivoted as described, and the presser, operated as set forth, for the purpose of firmly holding the cloth whilst it is being fed up or moved, as represented. Also, in combination with the beam, H, and its cam, q, the bar, o, and its cam, r, when said parts effect the purposes described.

74. HOISTING MACHINES; Daniel W. Barr, Lancaster, Pennsylvania.

Claim—The central pulley, beveled cog-wheels, and drums, side wheels, double pulley hoisting tackle, slide door, drum and crank, with cord.

75. APPARATUS FOR WETTING PAPER; Moses S. Beach, Brooklyn, New York.

Claim—The employment of the cloth, arranged and operated substantially as described.

76. PRINTING PRESSES; Moses S. Beach, Brooklyn, New York.

Claim—Producing intermittent blasts of air by means of the revolving hollow core having openings, and the stationary box having openings, arranged as described.

77. Feeding out Paper from Printing Presses; Moses S. Beach, Brooklyn, New York.

Claim—1st, The stationary guides and the arrangement of the rollers, or their equivalents, by which sheets coming from different directions are conducted into a single set of guide tapes or strings, in the manner described. 2d, Counting sheets into desired quantites by a counting table, consisting of an endless belt having an intermittent motion, arranged as described.

78. Blacksmiths' Tuyere; Harvey S. Berry, Rutland, Vermont.

Claim—A tuyere revolving in a wind-box supplied with wind in any ordinary way, with apertures in it, so arranged as to bring more or less of them at pleasure to bear upon the fire, and thereby diminish the fire and circumscribe the space affected by the blast, or enlarge the space and increase the fire.

79. Ploughs; John M. Burke, Dansville, New York.

Claim—Depressing and bending inward the rear and lower edge of the mould-board, as described.

80. Machinery for Pressing Tobacco; Wm. Cameron, Petersburg, Virginia.

Claim—1st, The construction of the ring which contains the tobacco boxes, viz: by segments held together by a band which can be tightened or loosened, and move independent of said segments, as set forth. 2d, The forming of a press by means of one, two, or more of such rings, enclosing a series of tobacco boxes with plates above and below them, and screw-rods furnished with hand wheels and nuts passing through said rings and plates.

81. Rendering Paper and other Fabrics Incorrodible; Thomas G. Chase, Philadelphia, Pennsylvania.

Claim—The application of paraffine either alone or in combination with naphtha, for the purposes described, so as to secure paper and other fabrics from the corrosive action of caustic alkali, in order that it may be put up securely in small parcels.

82. Propeller; George R. Comstock, Little Falls, New York.

Claim—The series of spring blades, hung and reversed, in combination with the cutting edges of the vibrating frame, the operation being substantially as specified.

83. Pen Fountain; John S. Cutts, Philadelphia, Pennsylvania.

Claim—The elastic tubular fountain open at both ends, and so combined with the pen that the fountain may be filled with ink through its upper open end by dipping the pen, as set forth.

84. Lacteal Instruments; Charles H. Davidson, Charlestown, Massachusetts.

Claim—Constructing the article known and worn as "breast shell," and made of any size, form, or material suitable for the performance of the well-known functions or uses proper of such device, with a transfer pipe or tube forming an integral part of the shell, when said tube is arranged as described, and serves for the ready and advantageous attachment of a flexible pipe with nipple jointed to it.

85. Aquaria; Elijah D. Davis, Brooklyn, New York.

Claim—1st, The mirror extending above the level of the front plate, and arranged in relation thereto, and to the contents of the aquarium, substantially in the manner set forth. 2d, The sustaining of the earthy matter in removable bottom, and protecting its upper surface by a hand coating, for the purposes as set forth.

86. Cushions for Billiard Tables; Levi Decker, Bergen, New Jersey.

Claim—The combination in a billiard table cushion of stretched and unstretched rubber, for the purpose described.

87. Life-Preserving Vests; T. A. Delano, City of New York.

Claim—A life-preserver having elastic fastenings or straps, and an inflatable air chamber or float, extending from the breasts underneath the arm holes, as described.

88. Operating Churns; Joseph Forsyth, Wheeling, Virginia.

Claim—The combination of the carriage with the movable platform, substantially as described.

89. Method of Opening and Closing Farm Gates; Wm. G. Hermance, Geneva, New York.

Claim—The suspension of the gates by means of suspension bars of unequal length with pulleys and slat heads, arranged as set forth.

90. Burglars' Alarm; N. Jensen, Washington City, D. C.

Claim—1st, Supporting the taper by a spring socket, arranged substantially as described, so that by the movement of the socket when the holding catch is withdrawn, the taper is lighted. 2d, On releasing the spring socket holding the taper, I claim lighting the taper and causing the alarm to be sounded by the movement of the socket. 3d, Arranging the alarm and the light in separate compartments in the box, for the purposes set forth. 4th, The fuse tube, constructed and arranged as described, so that the gases escaping from the vent will pass over the flame, and not come in contact with and extinguish the light.

91. Sleeping Berths for Railroad Cars; D. M. Lawrence, Cincinnati, Ohio.

Claim—The arrangement of the strap hinge, in combination with the ball and socket hinge, for the purpose of securing adjustable platforms or sleeping berths for railroad cars at any desired elevation.

92. Rotary Harrows; Wm. H. Main, Liverpool, Ohio.

Claim—The combination of the arm or centre pin, draft bar or platform, with the seat, for the purpose of causing the harrow to rotate by the weight of the person on the seat.

93. Printing Presses; Charles Montague, Hartford, Connecticut.

Claim—Communicating motion to the cylinder at the time of giving the impressions, by and through the motion of the bed, while the revolution of the cylinder shall be perfected by or through ordinary gearing, or other means entirely independent of the motion of the bed, thus alternating from one of these means to the other, to give a full revolution to the cylinder, in the manner substantially as set forth.

94. Shears for Cutting Sheet Metal; Daniel Newton, Southington, Connecticut.

Claim—The application to circular shears of two rods with a revolving cutter on each rod, sliding either way, to adjust the size of the circle.

95. Galvano-Electric Machine; Joseph R. Palmenberg, City of New York.

Claim—The arrangement and construction of a magneto-galvano electrical machine, having the helix and spring hammer, &c., situated in the inner part of the block or stand which supports all the other parts, and protected from any external danger through which the action of the apparatus might be deranged, substantially as specified.

96. Bee-Hives; Ebenezer W. Phelps, Elizabeth, New Jersey.

Claim—The small sectional adjustable frames, set in the main frames by means of half round grooves and rod, operating as described.

97. Securing the Ends of Railroad Bars; Augustus Plinta, Albany, New York.

Claim—The formation of a smooth joint where the ends of hollow rails meet, by inserting therein a plug of iron or dowel, movable by a pin, in combination with a transverse wedge, washers, and wedge-shaped spikes, combined and arranged substantially as described, when used without a chair.

98. Harvesters; Hosea W. Read, West Windsor, Vermont.

Claim—In its arrangement and combination with the tilting frame and the machinery for operating the cutters applied thereto, as described, a screw-rod or mechanism for spreading the bars of the tilting frame asunder, so as to throw the pinions of the cutter mechanism out of engagement with the gears of the driving-wheels.

99. Frames for Umbrellas and Parasols; Frederick Reichhold, City of New York.

Claim—Making the stretcher and rib of two wires each, forming the loops or eyes of the rib by coils of the exterior wire, and attaching the stretcher to the rib, the rib to the notcher, and the stretcher to the runner, by coils or hooks of the exterior wire.

100. Drop for Forging Metals; E. K. Root, Hartford, Connecticut.

Claim—The method of elevating the drop or hammer by means of a lifting strap having a vertical reciprocating motion, in combination with the retaining notches and pawls and the spring bolt, or their equivalents. Also, the method of disengaging the drop or hammer from the elevating straps by means of a wedge-shaped shoe on the strap, which strikes the end of the bolt, or its equivalents, and forces it clear of the strap, and into engagement with the retaining latch. Also, the employment of an adjustable disengaging shoe, in combination with the series of retaining notches and pawls, whereby the hammer may be readily disengaged from the lifting straps, and retained at any desired height from the base block. Also, the sliding ratchet bar, in combination with the retaining notches in the posts, and retaining pawls on the hammer, when arranged as described. And finally, in combination with the bolt which forms the connexion with the elevating strap, and with the retaining latch which holds the slide when disengaged from the elevating strap, or their equivalents, the employment of the angular lever, or its equivalent, by which the hammer may be readily disengaged from the elevating strap by the operator at any required point in the ascent of the hammer.

101. Connecting Metallic Tiles, Plates, Beams, &c.; Silas T. Savage, Albany, New York.

Claim—The application and use of hook and clasp-shaped terminals, at the ends or edges of malt kiln tiles and beams, or analogous structures, such as floors and beams of any kind, for the purpose of attaching them to each other, and supporting them firmly in a proper position.

102. Manufacture of White Lead; Benjamin F. Smith, City of New York.

Claim—Preparing the metallic lead for the purposes of perfect corrosion, by exposure to the action of acids, or other substances, in "spangles" of the size and configuration, substantially as described. Also, preparing the metallic lead for the purposes of perfect corrosion by exposure to the action of acids, or other substances, by causing melted lead to drop in a finely divided stream or streams upon a corrugated cylinder, or its equivalent, revolving or moving so as to throw off solid "spangles" of more or less the form and thickness described.

103. Elastic Material for Mattresses and Cushions; Thomas B. Smith, Marietta, Ohio.

Claim—The compound coil of spiral woody fibres described, when prepared as described, and used as a substitute for curled hair.

104. Machinery for Manufacturing Shirred Goods; Richard Solis, New Brunswick, New Jersey.

Claim—In combination with the rollers, or equivalent means for cementing the two lamina of cloth, and the rollers, or equivalent means, for keeping the united lamina distended, and for moving them as described, the employment of a bar, or the equivalent thereof, over which the united lamina are drawn to form the turned or lapped selvages. Also, in combination with the selvage bar, or its equivalent, and the means described for moving and keeping the lamina distended, or equivalents therefor, the employment of pins for turning the edges in forming the turned or lapped selvages.

105. Shirt Bosom Folders; John Stevens, City of New York.

Claim—The combination of a series of tins made with a series of pins, arranged in a slot in the angle irons attached to the bed-plate, the pins being adjustable, by means of which the plates can be made of any desired width without different sizes of tins, with the lifters for raising the tins from the pins.

106. Machine for Filing Saws; C. and R. D. Tabor, Ischua, New York.

Claim—The use of the file carrier and pressure frame, in connexion with the carriage, clamping jaws, and revolving platform, when constructed as specified.

107. Furnaces for Tempering Steel; Joseph Thomas, City of New York.

Claim—Arranging a plate, B, in an upright furnace with a central passage, A, in such a manner and in such relation to a tank, D, containing water or other suitable liquid, that a piece of steel wire or a strip of sheet steel may be heated and hardened without coming in immediate contact with the fire, by passing the same through the passage, A, and through the liquid contained in the tank, D. Also, arranging the two furnaces, A and E, and the tank, D, in such relation to each other that a piece of sheet wire or a strip of sheet steel may be hardened and tempered by one operation by passing the same through the plate, B, in the furnace, A, and through the liquid contained in the tank, and from thence between the plates, F and G, which are heated by the fire in the furnace, E.

108. Fringe Looms; Samuel Walker, Roxbury, Massachusetts.

Claim—1st, Riveting the thread carriers to a reciprocating frame, moving with the lathe. 2d, The guard plates, attached to the knife and operating in the manner substantially as set forth. 3d, Depressing each loop of fringe as it is formed, by means of the fingers, or their substantial equivalents, for the purpose of preventing them from being entangled and twisted up with the succeeding loops. 4th, Twisting the weft thread immediately before the loops of fringe are formed by pivoting its spool upon a revolving carriage.

109. Lathe for Turning Wood; Albin Worth, Stapleton, New York.

Claim—1st, The eccentric, A′, connected with the tool, V, and rotated through the medium of the gearing, q′ r′ s′, or q′ t′ r″ s″, or their equivalents, from the mandrel, A, so as to turn or cut the work in oval or polygo-

nal form. 2d, The combination of the patterns, s r, the eccentric, a', and cutting tools, p u v, attached to the slide rest, g, and the feeding device formed of the screw, e, and nut, i.

110. MACHINE FOR COILING METAL PIPES; P. D. Weimer, Lebanon, Pennsylvania.

Claim—1st, The coiling of hot or cold metal pipe on a plain cone or cylinder, by means of a movable groove or die. 2d, Feeding the movable groove or die forward, so as to form the coil by means of a pattern coil, or its equivalent, as described.

111. SEWING MACHINES; C. D. Wheeler, City of New York.

Claim—The combination of a sheave whose groove is sharp, or so constructed that the thread may jam therein by a partial passage around the sheave, with an adjustable friction brake to control the movement of the said sheave.

112. ROCK DRILLS; Lyman White and J. T. Bumgarner, Davenport, Iowa.

Claim—1st, The combination of the cam, d, swinging adjustable frame, b, slide bar, e, and screw-rod, c, containing the drill rod, k, arranged substantially as set forth. 2d, The combination of the adjustable plate, j, attached to the frame, b, arm, i, nut, h, with collar, k, and pawl, j, attached. 3d, The spring, u, interposed between the lower collar on the drill rod and the lower end of the screw-rod, for the purpose specified. 4th, Placing the screw-rod, c, on the drill rod, k, between two adjustable collars, t t, so that when the screw-rod has been fed or moved down the distance of its length, it may, by loosening or detaching the collars, be raised on the drill rod and secured upon it higher up in order to continue the work.

113. GRUBBING MACHINE; T. C. Wood, Charleston, Michigan.

Claim—The arrangement of the lever, the hinged supporter, the cord, the elliptical block, and hooks, all being secured in the carriage substantially in the manner specified.

114. LOCKS; Linus Yale, Jr., Philadelphia, Pennsylvania.

Claim—Providing a main bolt or bolts with two or more systems or sets of stops or tumblers, or their equivalents, whether alike in form and construction or dissimilar—commanded by or obedient to one and the same key, or its equivalent, or by separate and distinct keys, or their equivalents, so placed and arranged, whether near or distant, that when its key is applied to either one set, that set shall release the bolt irrespective and independent of either of the other sets.

115. RAILROAD CAR WHEELS; Thomas C. Ball, Assignor to self, L. Bisco, A. S. Davis, K. Crossfield, E. Edwards, and Jacob Green, Keene, New Hampshire.

Claim—(For a car wheel, with an insertion of rubber, or other elastic substances, between the two parts), the making of the rim or tire and its flanch in one piece, for the purpose of strengthening each other. Also, the mode of confining the two parts together, by means of the hook or pivot bolts, to prevent the wear and chafing of any stationary confinement—also, to be at liberty to make each bolt do its share of labor assigned, for castings are most invariably too uneven to get any equality of confinement in other modes.

116. SEWING MACHINES; Samuel Comfort, Jr., Morrisville, Assignor to self and F. H. Jackson, Philadelphia, Pennsylvania.

Claim—The guard, in combination with a bent needle, the inner edge of the said guard being in juxtaposition with the needle, and forming the segment of a circle of which the centre of vibration of the needle arm is the centre, for the purpose specified. Also, causing the needle thread to maintain the needle in proximity to the guard, and at the same time so guiding the thread to coincide with the groove of the needle, by means of the projection, arranged on the said guard.

117. SKELETON HOOP SKIRTS; R. J. Mann, Assignor to L. A. Osborn and J. J. Vincent, Brooklyn, N. Y.

Claim—In the construction of ladies' skeleton skirts, the combination of a series of horizontal hoops, adjustable in diameter with the bands or cards crossing and connecting them.

118. DREDGING CRANE; George Wood and John King, Assignors to selves and Wm. Lawrence, Philadelphia, Pennsylvania.

Claim—1st, The post with its pulley, and the barrel with its clutch, when arranged for joint action on the deck of the vessel, substantially as set forth. 2d, The carrier, with its pulley and its hollow stem, as arranged to turn in the socket in the end of the jib, in the manner specified.

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119. WASHBOARDS; John Adams, Pittsburgh, Pennsylvania.

Claim—A washboard having its rubber composed of glass, as described.

120. BOMB LANCE; A. F. and J. H. Andrews, Avon, Connecticut.

Claim—The employment of the independent movable fuse tube arranged within a bomb lance, substantially as described, so that the fuse will be ignited by the motion of the missile.

121. KNIFE SHARPENER; Alexander Annan, City of New York.

Claim—The two cutter plates with cut or corrugated surfaces, placed in oblique positions relative with each other, and arranged or fitted between the upright plates of a base, substantially as set forth.

122. INFANTS' CRADLE; Thomas C. Ball, Keene, New Hampshire.

Claim—The arrangement of the cranks, c c, pieces, d d, slot, e, and cross-bar, f, in combination with the spring and gearing.

123. SAFE LOCK; Obadiah Bayly, Jr., Dearborn Co., Indiana.

Claim—The action of niche wheel in preventing the bolt, b b, from being passed back so as to unlock; the application of a movable pinion on the shaft wheel, in connexion with a steel plate and hand, by means of which the lock is set to unlock at any given hour by the niche passing in front of the bolt, b b, and permitting it to pass within the niche, and not until then. Also, the application of security spring, security lever, and security catch, in allowing bolt, b b, to pass back and over the rim of niche wheel, and again securing it opposite the rim of niche wheel when the door is shut. Also, the application of stop levers in stopping the clock when the niche is opposite bolt, b b, by lever, s s, coming in contact with the cogs of wheel of the clock. Also, the application of spring, l, in pressing bolt, b b, against the plate of the works.

124. LATH MACHINE; Josiah Black, Memphis, Tennessee.

Claim—The vibrating table and lever, n, together with mechanism connected therewith for giving change

of motion to carriage, in combination with the lever, F', and the mechanism for opening and closing the dogs.

125. BEE-HIVES; Asa Blood, Sr., Norfolk, Virginia.

Claim—The main or breeding core, B, in enclosing case, in combination with the honey cores, D, in cap, E, the several parts being constructed in the manner specified.

126. MACHINE FOR MAKING SPOONS; J. P. Brinkerhoff, Brooklyn, New York.

Claim—The arrangement and combination of the rolling die, E, die, G, bolster, F, opening, h, and bar, H, as described.

127. ELECTRO-MAGNETIC FIRE ALARM APPARATUS; Moses G. Farmer, Salem, Massachusetts.

Claim—1st, The dial, the snail, and the key or lifting piece, A 2, in combination with an electric circuit and with the means of making and braking the circuit, for the purpose of striking a definite number of blows upon one or more bells, and of repeating the same, and of registering or indicating the number of the blows so struck. 2d, The arrangement of the circuit lever, l, the lifting piece, A 2, and pin, 1 2, so that the circuit shall be closed on the dropping of the lifting piece from off the pin. 3d, The arrangement of the circuit lever, c, rack, w, whereby the circuit is completed by the falling of the rack, and broken when the required number of blows has been struck. 4th, The combination of the circuit levers, l and c, operating in the manner substantially as set forth. 5th, The arrangement of the arm, f, the arms, a and b, or their equivalents, for the purpose of effecting electric communication alternately with the time magnet, D, and the tracing magnet, H.

128. SHOE PEG MACHINE; Azro Brown, West Waterford, Vermont.

Claim—1st, The combination and arrangement of the radial and slotted plate, t, eccentric helical or spiral edged plate, between which and the lower plate, e, it is confined; said lower plate having depressions and gutters in its upper surface for receiving corresponding parts formed on the lower surface of the slotted plate, and a raised or ridged portion nearer its centre, whose inner edge corresponds with the eccentric curvature of the edge of the plate, the said slotted plate and the other parts mentioned being arranged in the manner set forth. 2d, Giving an intermittent progressive motion to the slotted plate, by the combination of the ratchet notches on its under surface, spring pawl, K, and oscillating lever, l, attached by a connecting rod to the pitman rod. 3d, Forcing or conveying the strips of wood from which the pegs are formed after being cut from the block or bolt, by means of the combination and arrangement of the traversing bars guided by wheels on the end of the cross-head, at the angle where they are connected, curved groove, v, in the drum, P, and knives, w, between which the strip is first deposited and subsequently conveyed through the slot in the rim of the plate or rim, and under the V-shaped cutter. 4th, The combination of the cylindrical knife and cutters, as described.

129. DEVICES FOR SAVING THE SEED FROM HAY FED TO STOCK; R. A. Campbell, Salem, Indiana.

Claim—The combination of the inclined conductive passage, intermediate hay rack, and sieve bottom trough, substantially as set forth.

130. MODE OF CONNECTING ELECTRO-MAGNETIC APPARATUS WITH TOOTH FORCEPS; J. J. Clark, Philadelphia Pennsylvania.

Claim—The employment of the foot-key, or its equivalent, in combination with the electro-magnetic machine and forceps, arranged as described.

131. BILLIARD TABLE; H. W. Collender, City of New York.

Claim—The manner of applying steel springs as cushions to billiard tables, by clamping the lower portion thereof to the edge of the bed. Also, making the height of the cushions above the bed of the table, adjustable, that they may be adapted to balls of different diameter. Also, combining with the bed and cushions, a flanch or ledge outside of the cushions on a level with the bed, or nearly so, to form a rest for the hand when playing with the ball near to the cushion, as set forth.

132. POWER LOOMS; John Crawshaw, Rochester, New York.

Claim—1st, The lever, applied in combination with the cloth roll and with the spring of the take-up lever, to operate substantially as described. 2d, The rock beam, its arm, and pawl, applied in combination with the ratchet wheel, screw, and lever or levers, and weight or weights, to move said weights toward the fulcra of the friction strap lever, as the quantity of yarn on the yarn beam is reduced.

133. SEALING PRESERVE JARS; R. M. Dalby, Mount Washington, Ohio.

Claim—The yoke or ring, in combination with the leather, or its equivalent, as applied to vessels, substantially as described.

134. BURNING COAL DUST; G. B. Deppen and E. Devengood, Myerstown, Pennsylvania.

Claim—In combination with a fan-blower to promote combustion, the arrangement of the fire chamber, ash-box, perforated plates, combustion and exit chambers, communicating with each other and with the air trunk leading from the fan-blower.

135. SAFE LOCK; Leger Diss, Utica, New York.

Claim—The combination of the reciprocating stop-holder with the levers, stops, and the compound slotted tumbler, the construction being as described.

136. VAULT LIGHT; Cornelius Donaldson, City of New York.

Claim—The annular flanch on each glass, in combination with the supporting plates and the ring packings of rubber, or equivalent material, in substantially the manner specified.

137. VEGETABLE CUTTER AND COFFEE MILL COMBINED; B. Essig, Pittsburgh, Pennsylvania.

Claim—The mode of arranging and combining a vegetable cutter and a coffee mill in such a manner that by means of the sliding shaft, either of the two may be set in or out of gear.

138. STRAW CUTTERS; Wilson Green and Malcolm McFisher, Chattanooga, Tennessee.

Claim—The arrangement of the treadle, leather strap, the regulating board, and knife, combined with the double-leafed lever, C, lever, E, and upright standard, for joint operation, as described.

139. HAND HAMMERS; Alfred Gregory, Washington City, D. C.

Claim—The heft regulating "hammer shaft" or helve, operating to secure to the implement, of which it forms the handle, an enlarged and variable capacity to deal light or heavy blows, as required.

140. ASTRONOMICAL INSTRUMENT; Henry Glover, City of New York.

Claim—1st, The use of the double reflectors or mirrors, in combination with a vertical sight, whether

the said mirrors are fixed or made adjustable. 2d, The second graduated arc, in combination with the main instrument and with the second mirror, in the manner set forth. 3d, The supplemental arc, in combination with the level and with the main instrument, in the manner set forth.

141. CENTRE BOARDS FOR VESSELS; Jesse P. Potts, Apalachicola, Florida.

Claim—The two or more hinges or parallel bars, when arranged in the manner set forth.

142. BINDING ATTACHMENT TO HARVESTERS; Wm. Gray, Nicholsville, Ohio.

Claim—1st, The arrangement of gravitating platform and series of levers with their accessories, in connexion with a drive wheel for the automatic starting of the binding mechanism by the weight of the sheaf or gavel. 2d, In this connexion, the talons, constructed and operating substantially as set forth. 3d, In combination with the talons, or their equivalents, the crane and its accessories, having the described compound movement. 4th, In the described combination with the talons, or their equivalents, the pliers, constructed as set forth. 5th, The rod, "looper," and "tucker-in," constructed as set forth.

143. AUTOMATIC FEED-BOXES FOR ANIMALS; Albert Goodyear, 2d, Hamden, Connecticut.

Claim—The arrangement of the box, lid, spring, and catch, with sliding plate, dial, notch, and button, united together in the manner set forth.

144. HARVESTERS; Stephen Hall, Poughkeepsie, New York.

Claim—Connecting the inside shoe to which the finger bar is fastened directly to the main frame, or to one or both the end bars of the main frame, by means of circular bearings at each end of the shoe, without any coupling piece, in combination with a small wheel hinged to the inside shoe. 2d, The notches, holes, or slots in the shoe and flanches near the bearings or joints on which the shoe turns, in connexion with the movable catches or bolts that work in them to keep the finger bar in its proper place, or from rising or falling too much over uneven ground, in combination with a jointed shoe, constructed as represented. 3d, I do not claim simply attaching a wheel of any kind to the inside shoe—but I claim the arrangement of the small wheel, with the jointed frame or bar hinged to the inside shoe, by which the wheel is allowed to remain in the same position when the finger bar is turned up to go from place to place, as it is when the machine is cutting grass, and the finger bar rising and falling over uneven ground.

145. ANIMAL TRAPS; C. Jillson, Worcester, Massachusetts.

Claim—A rat or animal trap in which the jaws are moved from each other in a plane, and thus enlarge the opening between them, and which, when tripped, shall close up or contract the said opening, substantially as described.

146. HORSE POWER DRAFT; J. Herva Jones, Rockton, Illinois.

Claim—The combination of the levers and the flexible link, in the manner set forth.

147. BREAST PIPES; Thomas Lewis, Malden, Massachusetts.

Claim—The described combined nipple shell and breast pipe, constructed by the attachment of a neck and pipe to an ordinary nipple shell.

148. METHOD OF REGISTERING THE SPEED OF RAILROAD TRAINS; Charles T. Lierunr, Mobile, Alabama.

Claim—1st, In the indicating apparatus, the governor, placed in the lower part of a casing, which can be used as a car seat, said governor having its weights so united by connecting rods and levers as to cause them to remain in their centrifugal and centripetal action, uninfluenced by any horizontal jars and shocks of the car. 2d, The compensation beam, or its equivalent, with its rods and levers, to bring over the motion of the cross-head of the governor to the indicator, so arranged as to cause the vertical jolts and jars received by the various moving parts to absorb one another, and the indicator which points out the degrees of speed on the index, the whole so arranged as to enable the passengers and conductors to be constantly informed of the exact speed of the train. 3d, In the registering apparatus, I claim the circular register of metallic or other paper, with its radiating and circular lines expressive of distance and speed, said register receiving any degree of retarded motion from the car axle by means of the worms, and the worm wheels, and the pencil-holder with its adjustable pencil, the whole so arranged that the various degrees of speed on all parts of the road shall be noted down on the circular register.

149. TELEGRAPHIC INSTRUMENT; Rufus Kendrick and Alpheus W. Arkerson, Cambridgeport, Massachusetts.

Claim—The application to the finger key of a telegraph instrument of a rocking shaft, or its equivalent, to which a succession of vibratory motions of the proper proportionate durations for producing the characters required is communicated. Also, the construction and arrangement of the rocking shaft with its dogs, and of the keys, operating in combination substantially as set forth.

150. MACHINE FOR SAWING AND PLANING SHINGLES; George H. Mallory, City of New York.

Claim—The particular means employed for adjusting the bolt to the saw, in order to give the taper form to the shingle, in combination with the means employed for adjusting or moving the planer to its work, to wit: the bars, connected as shown, by the pendant and set-screws operated by the wiper and pins, and attached respectively to the bar containing the jaws which hold the bolt, and the bar connected with the planer head.

151. HARVESTERS; James S. Marsh, Lewisburgh, Pennsylvania.

Claim—The arrangement of the bent lever and the arm of the caster wheel, when said lever is pivoted behind, and said arm is pivoted before the axle of the driving wheel, and the two are connected by the link.

152. TONGS FOR COAL, &c.; James M. Meschutt, City of New York.

Claim—The metallic tongs for coal fires, &c., constructed with fingers or curved prongs and the projections, for the purpose of preventing the fingers coming too closely together.

153. HAND DRILLS; Frederick McNair, Fultonham, Ohio.

Claim—The arrangement of the feed-screw, and sliding gate, and frame, in combination with the adjustable bed, as described.

154. WASHBOARD; John Miner and Silas Merrick, New Brighton, Pennsylvania.

Claim—So impressing the corrugations equally upon both sides of the plate, that the medial or central line of the corrugated part of the plate may be in a line with the plane border, and that the ribs shall project equally on both sides, forming two equally good washing surfaces, as set forth.

155. MELODEONS, &c.; Isaac Rehn, Philadelphia, Pennsylvania.

Claim—1st, The employment of independent wind chests in melodeons, harmoniums, and other similar reed instruments, in combination with the suction bellows, for the purpose specified. 2d, The introduction

of the stop valves between the independent wind chests and the bellows, in combination with the appliances described, or their equivalents, for operating the said valves, when the said appliances are situated within the bellows.

156. CHURN; **Harry and Royal V. Robie, Eaton, New York.**

Claim—The perforated beater, in combination with the alternate beater, presenting a concave extremity in connexion with the passage formed by the narrow base of the beaters, the several parts being constructed and arranged upon the shaft with respect to each other, in the manner set forth.

157. MOULD FOR GLASS BOTTLES; **Samuel S. Shinn, Lancaster, New York.**

Claim—The mould constructed with its stationary portion of clay, plaster, or material of similar character, clamped between plates, and the opening portions of metal hinged to the upper clamping plate, substantially as set forth.

158. FORGE HAMMERS; **Benjamin Shiverick, Pittsburgh, Pennsylvania.**

Claim—The cam, so constructed as to act on the collar opposite the spindle, or nearly opposite the spindle during the whole time of its action in raising the hammer, except when the extreme end of the cam is passing out from under the collar to let the hammer drop. Also, a wedge, or its equivalent, so constructed and arranged as to be moved by the workman or attendant while the hammer is in motion, to graduate the action of the springs upon the hammer, to make it strike light or heavy blows, as desired.

159. CHURN; **Charles W. Stafford, Burlington, Iowa.**

Claim—The general arrangement and adaptation of parts, substantially as set forth.

160. BREECH-LOADING FIRE ARMS; **John C. Symmes, Watertown Arsenal, Massachusetts.**

Claim—The elastic flexible lip, substantially as described, however it may be applied to checking the escape of gas from the breech of breech-loading guns.

161. MACHINE FOR MOULDING BOOT AND SHOE SOLES; **Daniel J. Tapley, Danvers' Centre, Massachusetts.**

Claim—1st, Providing the lower former with a socket to receive the upper end of the wooden standard, and also with projecting ears to guide the rods and holes in the back flanch, to admit screws for confining the machine to a bench or the side of a shop. 2d, The combination of the spring, lever, and connecting guide rods, with the upper former, substantially as set forth.

162. HAME FASTENER; **John Tingley, Potter Co., Pennsylvania.**

Claim—The combination of two hooks coupled together by a semi-revolving force plate, and the spring, the catch, and the projection, when made and combined substantially as set forth.

163. SHIP-BUILDING; **Daniel Vrooman, Hudson, Ohio.**

Claim—The arrangement and combination of the inclined surfaces or projections, and the elastic fins or wings, with the hull of the vessel, substantially as described.

164. LOCOMOTIVE LAMP CASE; **Irvin A. Williams, Utica, New York.**

Claim—The combination of casings, B and C, with the chimney, A, the plates, p and p', alternating, and the construction and arrangement of the several parts, substantially as set forth.

165. INSTRUMENT FOR TRIMMING THE EDGES OF BOOT AND SHOE SOLES; **Isaac Rich, Assignor to Samuel C. Arnold, Manchester, Connecticut.**

Claim—The described instrument, consisting of the handle, guard, knife, and sliding gauge.

166. SPRING BED BOTTOM; **Noah Warlick, Chambers' Court House, Alabama.**

Claim—The wooden springs attached to the under side of the longitudinal slats, and resting on the transverse bar. Also, the use of metal or india rubber springs resting upon said transverse bar, for the purpose specified.

167. BRAIDING MACHINES; **Andrew B. Clemons, Derby, Assignor to the Birmingham Iron Foundry, Birmingham, Connecticut.**

Claim—Combining and arranging the tension and pawl blocks or weights, which have a rising and falling movement over the vertical guide bar in relation to the lower eye in the bar, E, and the bobbins, described, for regulating the paying out of the thread from the bobbin, and consequently its tension, in the manner set forth.

168. MACHINE FOR CUTTING BUNGS; **James Lyon and George H. Brady, Assignors to selves and Thomas J. Falls, Jr., City of New York.**

Claim—The cutters and stocks sliding in the adjustable blocks that are revolved by the face plate, and which cutters are projected by means of the disk, and act to cut a tapering bung.

169. RAILS FOR RAILROADS; **John Cochrane, City of New York.**

Claim—The making or forming of such rails by means of rolls, with additional metal upon the crown or head thereof, which additional metal is forced into the head or top part of the rail by a second process, thereby consolidating the head or top part of the rail, and hardening the bearing surface thereof, substantially as described.

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170. REFRIGERATOR; **Abel H. Bartlett, Spuyten Duyvil, New York.**

Claim—The wedge form and position of the ice and water receptacle, dividing the provision chambers, arranged as specified.

171. SASH FASTENER; **John Bostwick, Jr., Dedham, Massachusetts.**

Claim—A sash fastener having an independent eccentric and an independent bolt, combined as described.

172. TRUSS BRIDGES; **John C. Briggs, Concord, New Hampshire.**

Claim—The application of india rubber, or equivalent springs, to the compressed joints of truss frames and truss beams, substantially in the manner described.

173. DEVICES FOR CLAMPING AND FEEDING THE BOLT IN FELLY SAWING MACHINES; **Derwin E. Butler, Chesterfield, Ohio.**

Claim—1st, The bed, arranged with the rods and arms, connected by the bar and the spring, for the purpose of readily operating the bolt for feeding and removing the same from the saws. 2d, The jaw, formed on

the bent bar attached to the bed and spring, so that the jaw may be operated to grasp the bolt, and the bolt relieved therefrom by the movement of the bed, substantially as set forth.

174. MACHINE FOR SPLITTING LEATHER; Henry E. Chapman, Albany, New York.

Claim—The arrangement of the dished circular knife, the series of split springs, and the sliding bed, in their relation to each other, as described.

175. APPARATUS FOR HEATING AND VENTILATING BUILDINGS; Wm. H. Churchman, Janesville, Wisconsin.

Claim—The arrangement and combination of the induction and eduction flues or venti-ducts, K K′, the continuation flue of the venti-ducts, K′, the damper, and the registered openings, whereby any number of the rarifying drums, with their accompanying venti-ducts, may be used at pleasure, either for warming or ventilating alone, or for both at the same time, as described.

176. METHOD OF REGULATING THE WINDING OF TIME-KEEPERS; Jonathan Dillon, Washington City, D. C.

Claim—The described method of making springs or coils self-regulating, by the use of the slot and lever, or by any other similar device.

177. BLACKSMITHS' TUYERE; Benjamin E. Dixon, Marshall, Michigan.

Claim—The mode of regulating the length of the discharging orifice in a water tuyere, by means of the oblong tapered wind chamber, with grooves, or other equivalent device, in its casing, in combination with one or more of the tapered plugs, rods, and the detachable cover, to be used for the purposes described.

178. CHIMNEY CAPS; Charles Douglas, Cleveland, Ohio.

Claim—The frame, the valves, the cap, and the plan of linking the valves and cap together, to give them their proper relative positions, as described.

179. MACHINES FOR BREAKING STONES FOR BALLASTING RAILROADS AND TURNPIKES; A. C. Ellithorpe and Ives Scoville, Chicago, Illinois.

Claim—The cylinders constructed with a solid base and sectional shell, when the said shell is made in segments, and dovetailed and secured together, and dressed with teeth shaped and set as described, and when the said cylinders are used for breaking stone for Macadamizing or ballasting railroads, &c., substantially as set forth.

180. PICKER STAFF FOR LOOMS; Samuel Estes, Newburyport, Massachusetts.

Claim—The arrangement of the picker staff with the guide, with respect to the outer end of the passage, substantially as described.

181. MODE OF BAKING ARTICLES COMPOSED OF CARBON; DeGrasse B. Fowler, City of New York.

Claim—The manufacture of articles from a composition of carbon and gas tar, or their equivalents, when treated with pressure and heat, and baked in the presence of lime, substantially in the manner described.

182. GEARING; G. B. Gansher, Reading, Pennsylvania.

Claim—The arrangement on the wheels, E and F, of the plates, A A′ A″, rollers or wheels, B B B, plates, D D′ D″, and collars, O O O, the whole being constructed and operating in the manner specified.

183. STRAW CARRIERS; Carlos W. Glover, Farm Ridge, Illinois.

Claim—In combination with a series of bars having the motions described, the spring shield for aiding to guide the stalks or other thing conveyed thereon, and for preventing their falling back or becoming entangled.

184. GEARING; Ebenezer A Goodes, Philadelphia, Pennsylvania.

Claim—Providing the wheels respectively with spiral projections and spiral grooves, substantially as described.

185. BRICK MOULDS; James A. Hamer, Reading, Pennsylvania.

Claim—The two crank rods, or their equivalent, as connected with the followers and secured to the frame, and as operated upon by the hand piece.

186. COOKING RANGES; Joshua Harrison, City of New York.

Claim—The arrangement and combination of the flues, C and F; with the breaks or parts, G I and 2, substantially as described, and the dampers in connexion with the main flues, F F, directly underneath the fire, for the uses and purposes set forth. Also, the arrangement of the broiling grates with the flue, for the purpose of applying the heat of such fires directly to, and making it effective in, heating that part of the range most distant from the principal fire. Also, the construction and arrangement of the top plate, as described, by which the front and back rails are made a part of the body of the range, while the central part of such plate is made in separate sections, the back rail being also a base or foundation for the mason work, as set forth.

187. COOKING STOVES; Richard M. Hermance, Stillwater, New York.

Claim—The arrangement of the flue strips in the chamber, in combination with the fire-box, descending flues upon the sides of the stove, and oven flues under and back of the oven and exit pipe, arranged and operating together substantially as set forth.

188. SCREW WRENCH; Joseph Hyde, Troy, New York.

Claim—1st, The arrangement of the thumb-piece and the screw, in the manner and place described. 2d. Making the sliding jaw, E, in two equal parts, divided on a vertical line parallel with the bar, D, and the jaw, L, so as to cast the nut and the recess at the same casting of the said sliding jaw.

189. INKSTANDS; Orlando H. Jadwin, Carbondale, Pennsylvania.

Claim—In combination with a hollow plunger for raising the ink, an independent cup for holding said ink, and from which it cannot, by the ordinary want of tightness, flow back into the reservoir.

190. TOURNURES; Benjamin Johnson, Philadelphia, Pennsylvania.

Claim—A curved elastic projection or support, consisting of the springs and webbing, or their equivalents, when the said springs are constructed, arranged, and fixed to a waistband, so as to be held out thereby free from the under garments and person, as described, that they may operate in connexion with the webbing, substantially in the manner described.

191. METHOD OF NEUTRALIZING LOCAL ATTRACTION OF THE NEEDLE; Calvin Kline, Brooklyn, New York.

Claim—Applying and arranging the magnet or magnets in a horizontal position or positions below or

above the needle of the compass, with opposite poles in the vertical plane of the axis about which the needle turns, and on opposite sides thereof, and in such a manner as to be adjustable on centres lying in, or as nearly as practicable in, the vertical axis about which the needle turns, that their poles may be made to point in any direction necessary to compensate for local attraction, and have such direction varied as may become necessary.

192. FURNACES FOR EVAPORATING SUGAR JUICE; Louis Lefebre, New Orleans, Louisiana.

Claim—In combination with the fluted outer surface of the kettle, forming the masonry constituting the opposite face of the flue with corresponding flutings or corrugations, so as to surround the kettle with an undulating passage for the products of combustion.

193. REFRIGERATOR; Adolphus Lipmann, City of New York.

Claim—The described arrangement of a series of coiled pipes which emanate from the ice chamber, and which are carried down between the two walls of the refrigerator to a central coil.

194. SMUT MACHINE; Hugh Marshman and Charles F. Foulke, Carlisle, Iowa.

Claim—1st, The combination and arrangement of the casing and funnel-mouthed opening, the parts being so arranged in relation to each as to, at the same time, give a converging descent to the grain, and an inward partially downward blast through it at that point. 2d, The introduction of an auxiliary blast into the upper portion of the horizontal trunk, as described, by which a more perfect separation of the light grain is secured.

195. MOULDS FOR MAKING BOTTLES; John L. Mason, City of New York.

Claim—The combination of the screw thread with the rim, f, and also its combination with the rim, r, for the purposes set forth. Also, the combination of the grooves in the female screw of the mould, with the air passages through the mould, for the purpose set forth. Also, the blower-over, in combination with the moulds for the necks of bottles. Also, a flanch above the blower-over, as described.

196. ORE SEPARATOR; L. Stadtmuller, Bristol, Connecticut.

Claim—The apparatus described for sizing ores, constructed as specified.

197. SADDLE-TREES; Jesse Nece, Philadelphia, Pennsylvania.

Claim—1st, Rounding the under side of both the pommel and cantle of a wooden saddle-tree where they bear on the side pieces, and employing, in combination with the whole, the side strips, so that the said side pieces may be free to vibrate on their hinges, and still retain their proper relative position with regard to the pommel and cantle. 2d, The metal arch pieces secured to the pommel and cantle of the saddle-tree, as described.

198. FARM GATE; Wm. Newlone, Penn Yan, New York.

Claim—1st, The combination of the post and hinges, constructed as described. 2d, The chain, or its equivalent, with the means for adjusting the same, as specified. 3d, The catches and latch, combined with the means for actuating the same, as arranged in the specification.

199. PRESERVING SURFACES OF CAST OR WROUGHT IRON; Charles Francis Leopold Oudry, Paris, France.

Claim—1st, The employment of a varnish, or of successive varnishes, insulating, metallizing, and intermediary, between the object to be coated with copper—whether the same be metallic or non-metallic—and the protecting copper itself, all or a part of said varnishes being composed of certain metallic substances united with fat or essential oils, and gummy, resinous, bituminous, or asphaltic substances. 2d, The coating of all kinds of objects with copper, by the employment of one or several varnishes in succession previous to the galvanic coppering obtained directly in a bath of sulphate of copper, i. e., without the intervention of a bath of cyanide of copper.

200. BUSTLES FOR LADIES' DRESSES; George V. and Edwin A. Pierce, City of New York.

Claim—The springs, a a, fitted into a bishop or bustle, in combination with a lining or strap, forming a straight line of connexion between the ends of said springs, for the purposes set forth; and in combination with said springs, a a, fitted into a bishop or bustle in the manner specified, we claim the springs, c c, arranged and acting in the manner described. Also, the strap, f, or tape, in combination with the springs, a a, and bustle, substantially as specified.

201. GRATE BARS; Silas T. Savage, Albany, New York.

Claim—The employment of the bar, a, when provided with a series of flanches which form an arc above the bar, and which taper from the extremities of the chord of said arc, to or near the bottom of the bar, and thus supporting the coal in arches above the bar, and at the same time strengthening and sustaining the bar by the tapering sides of the flanches.

202. KNITTING MACHINES; Frederick Schott, Brooklyn, New York.

Claim—1st, The combination of the levers, G and H, the dog, G′, spring, K, sliding bar, I, adjustable stops, E′ E, and the eccentric, H′, or its equivalent, on the main shaft, the whole operating to effect the movement of the needle bed in one and the other direction alternately. 2d, The two-grooved safety guide, applied in combination with the feeder, to operate substantially as specified. 3d, The needle and stitch hook protector, applied as set forth. 4th, The combination of mechanism to operate the sinker or reliever, consisting of the cam on the main shaft, the arm and spring on the rock shaft, the spring applied to the reliever bar, the projection on said bar, the stationary inclined projection on the frame, and the stationary inclined planes, as set forth. 5th, The combination of the bar, X, or its equivalent, furnished with teeth, and a wedge-like projection, the pawl operated by the movement of the needle bed and the stop lever, the whole applied to operate in combination with a belt-shipper, to stop the machine as soon as any desired number of courses have been knitted.

203. MACHINE FOR PRINTING NAMES OR DIRECTIONS ON PACKAGES, &c.; James Spencer, Toronto, Canada.

Claim—The application of common type arranged in a form upon a plane bed, to the printing of successive names, numbers, or addresses, one at a time, upon papers, pages, books, tickets, or other articles requiring to be printed, marked, or addressed; and the construction of the machinery, as described, or any similar combination of machinery for producing the same motions, causing the bed to traverse so as to bring all the names, numbers, or addresses in the form successively under the aperture in the tympan, and causing the matter placed under the platen to receive the desired impression.

204. SEWING MACHINES; James H. Spencer and Thomas Lamb, Philadelphia, Pennsylvania.

Claim—1st, The vibrating or reciprocating carrier with its permanent projections, yielding projections, and spring-retaining catch, in combination with the shuttle plate, its casing and spool, when the several parts are constructed substantially as described, and when they are arranged in respect to each other and to the lip, as set forth. 2d, We do not claim, broadly, feeding the fabric by the combined vertical and lateral motion of a roughened surface feed bar on the said fabric, as such a device is described in the patent of A. B. Wilson,

granted December 19th, 1854. But we claim the arrangement of parts described, for feeding the fabric and regulating the amount of the feed, that is to say, the cams, spring rod, arms, the rod, its collar, and adjustable nut 3d. The cylinders, 3 and 4, with their respective pins, when arranged in respect to each other, to receive the folds of the needle thread so that by turning one or both of the said cylinders, the pins may cause more or less of the folds to bear against the surface of the cylinder.

205. WIND MUSICAL INSTRUMENTS; C. J. Van Oeckelen, City of New York.

Claim—1st, The application to a musical instrument of several different rows of reeds, combined in such a manner that each key of the instrument can produce several different sounds, by causing one or several reeds to vibrate according to the pleasure of the performer, preserving always, nevertheless, the proper musical expression of the note, in the manner substantially as described. 2d, The arrangement of the several parts in such an instrument by which the power is obtained of causing each note to vibrate on itself, and independently of all the others, in the manner substantially as described. 3d, The application to a musical instrument, the sounds of which are produced by the vibration of reeds of several rows of valves, so arranged as to act one upon the other, and that the valves of the different rows thus connected can be opened either all together or only one or more at a time by touching the same key of the instrument at the pleasure of the performer, preserving always, nevertheless, the proper musical expression of the note.

206. MANUFACTURE OF SEWING NEEDLES; Henry Walker, Alcaster, Warwickshire, and Gresham Street, London, England; patented in England, May 19, 1858.

Claim—Forming the eyes of needles in the cylinder of the wire, without flattening the same, by means of the double grooves.

207. THRESHING MACHINES; M. D. Wells, Morgantown, and Harrison Hagans, Brandonville, Virginia.

Claim—The combination of the bifurcated spikes of the cylinder with the peculiarly notched ribs of the concave, operating together as described.

208. PARASOLS AND UMBRELLAS; Edward Young, Philadelphia, Pennsylvania.

Claim—The combination and arrangement of the stationary tube with the swivel rod, substantially as described.

209. SEWING MACHINES; H. W. Harkness, Assignor to self and W. H. Nettleton, Bristol, Connecticut.

Claim—Feeding the cloth to sewing machines by the combined action of a smooth reciprocating pressure foot and a vertical clamp, acting at the end of said foot to hold the cloth firmly while being moved, the bend or angle thus formed in the said material enabling the feed to act with but little pressure on the goods from the smooth foot-piece, as specified.

210. GRAIN AND FRUIT DRYERS; Charles A. Haskins and G. Macardle, City of New York, Assignors to Joshua A. French and Eliza C. Tyrrell, Jersey City, New Jersey.

Claim—The traveling pipes and adjustable drums, and the form of the drums through which the hot air is compressed and distributed over and through the material to be dried. Also, the carriage and seats upon which the drums are adjusted, supported, raised, and carried, in combination with the pipe journal, gear wheel, and chamber.

211. RECLINING CHAIR; A. E. Kendall and P. K. Keyes, Assignors to selves and C. W. Elton, New York.

Claim—In combination with the swinging post, jointed arm, and back, the employment of a serrated segment and fastening, constructed and operating substantially as set forth.

212. LOCKS; Wm. Moore, Brooklyn, New York, Assignor to G. L. Cameron, Chester, C. H., South Carolina.

Claim—As an improvement on my said patent of September 14, 1852, the check tumbler, and spring, in combination with the tumbler that is acted on from both key-holes.

213. COOKING STOVES; Gibson North, Assignor to North, Chase & North, Philadelphia, Pennsylvania.

Claim—The arrangement of the grooved back of the fire chamber, the cold air chamber in the flue, and the guard plate at the corner of the oven.

214. SEWING MACHINES; James Perry, Assignor to Isaac C. Noe, New York.

Claim—The combination and arrangement of the levers and cams for imparting the three reciprocating movements to the looper, namely, that in the arc of a circle, the lateral, and the vertical, in the manner described. Also, the shield, in combination with the looper and needle, arranged and operating in the manner described, for the purpose of presenting the loop to the looper with greater certainty.

215. MACHINE FOR MAKING ENVELOPES; M. G. Puffer, Assignor to Cyrus White and L. A. Corbin, Rockville, Connecticut.

Claim—1st, The shape essentially of the cams, for the purposes set forth. 2d, The employment of the jack, F, arm, c, operating as described, to paste and lift the paper, and the fly to separate it therefrom on to the carrier. 3d, The carrier, shaft, fingers, arm, stud, catches, and arms, for the purpose as described. 4th, The combined action of the bed with the plunger, for the purpose as described; also, the employment of the springs in the plunger. 5th, The folding flaps projecting from the centre, or nearly so, from the end of a shaft or shafts, and having their bearings on one end or on each end thereof, whether with or without the half circle. 6th, The construction and arrangement of the catch wheel with a long tooth and guard, for the purpose as described. 7th, The arrangement of the nippers, operating in the manner described.

216. MACHINES FOR TARRING ROPE YARN; John Stewart, Assignor to Charles Wall, Brooklyn, New York.

Claim—The employment within the tar vat of one or more series of sheaves or conductors over or round which the yarns are bent, in the manner described, to open their fibres, and make them pass and return in an opposite direction through the tar, for the purpose set forth.

217. APPARATUS FOR BORING WELLS; I. M. Butler, Oxford, Mississippi.

Claim—The square-chambered auger, constructed substantially as set forth.

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218. KETTLES FOR TRYING OILS; J. L. Alberger, Buffalo, New York.

Claim—A horizontally placed cylindrical boiler or tank surrounded by a steam-jacket, or having the steam admitted directly into it, when said boiler or tank is capable of being turned over in its cradle, and have all its contents run out at the man-hole—and this I claim whether said boiler be used in connexion with a condenser or without it.

219. CURTAIN FIXTURES; Thomas C. Baldwin, Newton, Massachusetts.

Claim—The detaching chamber and passage, in their combination and arrangement with the journal bearings of the two bearing blocks, and with the rotary friction ratchet, its spring and the pulley being arranged at one end of the curtain roller. Also, the arrangement of the rotary friction ratchet spring and the pulley at one and the same end of the curtain roller, or so that the said ratchet may turn on the journal projecting from the said pulley, in manner described.

220. TACKLE BLOCK; W. B. Barnard, Waterbury, Connecticut.

Claim—A tackle block having its bushing secured and adjusted to the pulley by means of a nut.

221. TOOL FOR CUTTING KEY SEATS IN WHEELS AND PULLEYS; James Barton, Cleveland, Ohio.

Claim—The employment of the shaft provided with a series of cutters which are adjustable, the two being so arranged that by pressing them through the hole or bore of a wheel or pulley, a key seat is finished parallel with the bore. Also, the employment of a tapering circular step or wedge between the cutter shaft and the bore of the wheel or pulley on the opposite side from the cutters while the key seat is being cut, for the purpose of cutting a tapering key seat.

222. SEED PLANTERS; James F. Beckwith and Adin G. Gage, Alabama, New York.

Claim—1st, The combination of the raising lever, when arranged with the marking wheel. 2d, The combination of the cranks on the axle of the marking wheel, when arranged with the markers, whereby the exact positions of the measuring recesses in the seed deliverer are indicated to the driver.

223. PIPE TONGS; James R. Brown, Boston, Massachusetts.

Claim—In the crossed lever jaw pipe tongs, the arrangement and application of the adjusting screw with reference to the fulcrum pin, the slot, and the hooked jaw lever.

224. PHOTOGRAPHIC PLATE SHIELD; Henry Bryant and R. D. O. Smith, Washington City, D. C.

Claim—The application of the bent wire, or its equivalent, for the purpose of opening and closing the door on the inside of the camera, in the manner described.

225. SCISSORS; Joel Bryant, Brooklyn, New York.

Claim—The exclusive use of scissors when provided with a spring or springs connecting with the rivet and blades, substantially as described.

226. APPARATUS FOR ASSORTING EGGS; Henry Burt, Newark, New Jersey.

Claim—The arrangement of the perforated surface, for receiving the eggs and excluding the light. Also, the mirror, in combination with the above, arranged substantially as specified.

227. FIRE ENGINES; Lysander Button and Robert Blake, Waterford, New York.

Claim—Placing the cylinders diagonally to the line of the rock shaft, in the manner set forth. We do not claim contracting the air vessel at its base or its point of attachment to the water ways or channels of fire engines. But we claim combining with the horizontal water way or channel, the air chamber, divided into two compartments by the contraction at or about one-half the height of said air chamber above its base or point of attachment to said water way. Also, in combination with the hour glass contraction of the air chamber, the ring enlargement of the rock shaft, as set forth.

228. EXTENSIBLE LIFE RAFT; Calvin Furbush, Kittery, Maine.

Claim—The combination of the diagonal braces, sleeves, and guide bars, with the tubular floats, in the manner set forth.

229. SEWING MACHINES; S. S. Burnet and Wm. Broderick, Chicago, Illinois.

Claim—1st, The employment of the rocker, in combination with the cranks of the driving shaft, and the needle bar or slide for giving the required motions to the needle bar to accomplish the formation of the loop, and simultaneously allow the shuttle time to pass through the loop before the loop is drawn tight, and thereby accomplish the interlocking of the two threads, and the drawing of the stitch tight on the cloth. 2d, The employment of an auxiliary adjustable thread guide, in combination with the rocker and stationary thread guide, for the purposes of governing and adjusting the amount of thread for each stitch. 3d, The employment of the segment friction plate hung on a horizontal axis with or without index pointer, in combination with the thread guides, for the purpose of causing a greater or less tension upon the upper or needle thread. 4th, The employment of a vertical sliding unyielding pressure bar, formed of two pieces, which are right and left screw-tapped, and coupled together by an adjustable link nut, in combination with a jointed, pivoted, feeding and holding-down pad, and a vertically and laterally-acting cam of the rocker, in the manner substantially as specified.

230. HARVESTERS; Nicholas Clute, Dunnsville, New York.

Claim—The construction and arrangement of the several parts, for the purpose of allowing the ends of the rakes to pass over and around the reel, in the manner specified. Also, the pulley when arranged to tip or vibrate the rake teeth at the top of the inclined plane, and release the grain and straw, and let it fall into the trough or box.

231. CUT-OFF VALVES FOR STEAM ENGINES; J. M. Colman, Milwaukie, Wisconsin.

Claim—The arrangement and combination of the flap valves, valves, jointed toes, rods, levers, and governor, as described.

232. PUMPS; Asahel Cooley, Springfield, Illinois.

Claim—1st, The parts composing the piston and its valves, when combined with the hollow piston rod, as described. 2d, The parts, H K and I, constructed as described, when combined with the hollow piston rod.

233. HOSE COUPLING; James C. Cook, Middletown, Connecticut.

Claim—The female parts in combination with the male parts, arranged for the purpose specified.

234. ARRANGEMENT OF CUTTERS FOR TURNING HUBS; George Cooper, Berlin, Wisconsin.

Claim—The arrangement in the same machine of the adjustable preparatory and main cutter stocks, furnished with suitable cutters, in combination with any ordinary turning lathe or revolving centering shaft.

235. MODE OF SECURING THE ENDS OF RAILWAY BARS; Christian E. Detmold, Orange, New Jersey.

Claim—The mode of joining rails at their ends to form continuity thereof, without the use of chairs or plates, bolts or rivets, or of any other fastenings, by inserting iron joint pieces of such shape as to fit into slots in the shanks of two contiguous rail ends, and at the same time afford a support to the head of said rails,

whereby the rails are permanently kept in the same vertical and horizontal planes, and are allowed to expand and contract, substantially as set forth.

236. ASH AND GARBAGE SAFE; William Gee, City of New York.

Claim—The combination in a close case of the two chests, with rollers and arms extending from foot attached to the case, the top being ornamented; also, the mode of securing the said chests and case, as described.

237. MACHINE FOR MAKING WINDOW-BLIND SLATS; Isaac W. Gere, South Granby, New York.

Claim—A machine that will take a rough slat as it comes from the bolt, and automatically pass it along to and past the series of mechanical devices that will plane, dress, and form the tenons thereon, and complete the slat before it leaves the machine.

238. FURNACES OF STEAM BOILERS; F. P. Dimpfel, Philadelphia, Pennsylvania; patented in England, May 24th, 1856.

Claim—The passages through the water spaces entering the combustion chamber or extension of the furnace. Also, the means for providing for the perfect consumption of the finer particles of fuel and products of combustion, as set forth.

239. STEAM TRAP; Frank Douglas, East Liverpool, Ohio.

Claim—1st, The arrangement within the box of the horizontal cylindrical chamber, the two disk valves, with their interposed adjustable stem, the levers, and connexions of said levers, with the float. 2d, The spherical float guard applied within the box, and in relation to the inlet passages, as set forth.

240. SEEDING MACHINES; Warren Drummond, Woodbridge, New Jersey.

Claim—The elastic rollers arranged relatively with the slides, to operate as set forth.

241. BLIND OPERATOR; L. N. Fay and Wm. Mason, West Warren, Massachusetts.

Claim—The spirally flanched plate and worm-wheel, when attached to the sill and used in connexion with the slotted bar, stop, and the slat-adjusting device formed of the arms, shaft, and spring, as set forth.

242. HOT AIR FURNACES; John R. Fergusson, Brooklyn, New York.

Claim—The combination and arrangement of the various parts, as described. Also, the evaporation pan in the hot air chamber of the furnace, when made adjustable vertically, as set forth.

243. DEVICE TO PREVENT INJURY FROM RUPTURE OF THE MAIN SPRING OF WATCHES; David Bucklin Fitts, Holliston, Massachusetts.

Claim—The separation of the barrel and the main or other gear wheel of the train, so that the two can revolve independently of each other, and the application thereto of mechanism described, and termed a "reverse motion," as explained.

244. SEDIMENT COLLECTOR FOR STEAM BOILERS; Hiram H. Havens, City of New York.

Claim—The vessel, a, fitted with a blow-off pipe, in combination with the rings, or their equivalents, presenting alternate horizontal edges and openings from the highest to the lowest water gauge or level, as specified.

245. SEWING MACHINES; Albert H. Hook, City of New York.

Claim—The combination of the levers, arm, spring, and cam, constructed as set forth.

246. SEEDING MACHINES; R. W. Hunt and M. Kennedy, Galesburg, Illinois.

Claim—Arranging the levers and plates which form the dropping device with the levers in the tubes, as described, whereby the above named parts are rendered capable of being operated simultaneously by the simple action of the bars on the ends of the levers.

247. SHUTTER FASTENER; John McGerrah, Philadelphia, Pennsylvania.

Claim—The application of the brace to the under leaf of an ordinary hinge, and the nut as a continuation of the axis of the segment on which revolves the upper leaf of the hinge, which is secured by the brace and the pin securing the embrace of the brace and nut.

248. SUPPORTING INSULATOR FOR LIGHTNING RODS; N. N. McLeod, St. Louis, Missouri.

Claim—So cutting the groove in the edge of the glass as to form the elliptical body shown at a', fig. 1, whereby the insulator is attached to the building, in the manner described. Also, the combination of the two straps with the glass, and with the pointed conductor, constructed in the manner set forth.

249. PRINTING PRESS; David E. James, Utica, New York.

Claim—The arrangement and combination of the leverage through which the operations of the press are performed, including the use of the spring which permits the extension of the lever, q, while the carriage is at rest. Also, in combination with the said arrangement of leverage, the swinging post, and its connexion with the lever, o, as described.

250. PUMPS; A. L. Keeports and George Palmer, Littlestown, Pennsylvania.

Claim—The combination of the main pump with the reservoir and ascension pipe, elastic spring valve, the whole arranged in relation to the proportions existing between the valves and pipes, operating as described.

251. CORN PLANTERS; David Ladd, Dearborn, Michigan.

Claim—The peculiar arrangement of the frame, shafts, axle with cavities, wheels, box, ploughs, tubes, scrapers, and rod attached to axle, c, as described.

252. SEEDING MACHINES; Daniel and Austin S. Markham, and David Eldred, Monmouth, Illinois.

Claim—The arrangement of the rotating shaft provided with distributing wheels having buckets attached, the slide bar, the plate, and adjustable strips or bottom, whereby seeds may be planted from the same seed box, either in drills, check rows, or broad-cast, as may be desired.

253. PRESERVATION OF FLESH FOR FOOD; Nathan B. Marsh, Cincinnati, Ohio.

Claim—1st, Preparing carcasses for injection, and injecting the same, in the manner set forth. 2d, The injecting or transmitting of the saline solutions at a temperature below or above the freezing point, or thereabout, as set forth, so that the flesh may be cooled from within outward. 3d, Injection of portions of the carcasses, as well as the whole beast, with the solutions indicated, in the manner set forth.

254. SCREW-NECK BOTTLES; John L. Mason, City of New York.

Claim—A screw-neck or nozzle of a jar or bottle, in combination with a groove separating the thread from

the shoulder of the bottle or jar. Also, a screw on the exterior of the neck of a bottle or jar, in which the neck extends above the screw-thread, and the thread vanishes into the neck of the bottle or jar, as described.

255. GAUGE COCK; Richard L. Mills, Lancaster, Ohio.

Claim—The arrangement and combination of the lining tube and cap, containing the adjustable seats, with the double valve stem, as described.

256. APPARATUS FOR HOLDING SHEEP; S. Minnick, Hopewell, Ohio.

Claim—The adjustable couches, in combination with the neck piece and extension levers, arranged in the manner set forth.

257. VALVE GEAR FOR STEAM ENGINES; Edward Moran, City of New York.

Claim—Operating the valves by means of a valve guide, the movements of which are regulated by projecting cams. Also, the reversing apparatus, as set forth. Also, presenting and withdrawing the cams that give motion to the guide, so as to bring the cams into motion at the proper time to produce the desired valve motion, as specified.

258. VALVES OF STEAM ENGINES; Alden R. Morrill, Northfield, Vermont.

Claim—The arrangement of the valve case, its induction and eduction ports, with respect to the steam chest and the double-headed piston, made in manner to operate within such valve case, as described. Also, when the valve case is made tubular and open at both ends, making it separate from the steam chest, and so as to rest on the bottom of the latter, and confining it therein by means of screw-bolts extending through the top plate of the steam chest, and made to rest on the said valve case. Also, the arrangement of the safety valves and their conducting passages with reference to the double-headed or slide valve, in which arrangement the steam, in passing to the safety valves in order to raise them, does not pass through the double-headed piston or slide valve, but through passages arranged on the opposite sides thereof, as described.

259. MACHINE FOR CUTTING CURVILINEAR SURFACES ON ANGULAR PIECES OF WOOD; George Muller, Sacramento, California.

Claim—A convex plane bit, with edges beveling inward toward the centre, for cutting smooth chamfers of any shape on the edges of railing for express wagons, or on other pieces of wood, and the stand or rest connected therewith in the same machine by means of jaws movable in the frame; the rest or stand may be secured in any desired angle toward the plane to obtain a chamfer of any desired depth and bevel, and also of different shapes.

260. UNDER-DRAIN PLOUGHS; James and Edward Nevison, Morgan, Ohio.

Claim—The adjustable weighted roller, in combination with the plough and drags, as set forth.

261. AUGER FOR WOOD; Martin Norris, Broad Brook, Connecticut.

Claim—The attachment applicable to the common auger, bit, or other boring tool in use, and adjustable in the manner and in connexion with said auger or other boring tool, as specified.

262. SECURING THE ENDS OF RAILWAY BARS; John F. Peabody, Salem, Massachusetts.

Claim—The mode of constructing the chair and rails, the same consisting in making the said chair with the two reverse dovetailed recesses, and the rails with dovetails to enter such recesses. Also, constructing the dovetailed recessed flanch cap, with a projection extending below it, in connexion with making the base plate of the chair, with a recess to receive such projection.

263. LADIES' HOOP SKIRT; S. Peberdy, Philadelphia, Pennsylvania.

Claim—The combination of a spiral stay with the fabric which constitutes a lady's skirt, when said stay is formed by winding a flexible strip or rod made of one piece, or of a series of pieces spliced or united together continuously round the skirt from the bottom to the top of the body of the same.

264. VALVE GEAR OF LOCOMOTIVE ENGINES; Charles J. C. Peterson, Davenport, Iowa.

Claim—1st, Connecting the eccentric ring, from which the slide valve is operated, to the spring which rests on the journal box of the axle, on which the eccentric plate or cam fitting into said ring is fastened, so that the up-and-down motion of the axle has no influence on the motion of the slide valve. 2d, In combination with the eccentric ring attached to the spring, the arrangement of the cam in connexion with rods, and the rocking piece, whereby the slide valve is thrown wide open before the piston has accomplished one-quarter of its stroke, and which rods and rocking piece are so constructed that the motion of the slide valve may be reversed by raising the hook from one step of the rocking piece to the other one.

265. PASTING APPARATUS FOR BAG MACHINES, &c.; S. E. Pettee, Mansfield, Massachusetts.

Claim—Controlling the flow or draft of the paste when carried from a reservoir by a wheel or roll placed in a passage through the bottom of said reservoir, the roll receiving its motion from the passage of the paper under it, when said controlling is effected by means of the piece, D, and screw, E, in the manner described.

266. STEAM ENGINES; Rufus Porter, Washington City, D. C.

Claim—Furnishing steam engine cylinders with balance valves combined with lifting shafts, and so arranged that both induction and eduction valves communicate with the same port. Also, in combination with balance valves, arranged as described, so connecting the induction valves to a governor, by an arrangement of mechanism, that the said induction valve shall be so regulated by the governor as to admit into the cylinder such quantities of steam as shall be required to maintain a proper and uniform motion of the engine.

267. PUMPS; O. W. Preston, Jr., Corning, New York.

Claim—The employment of the elastic band, or its equivalents, serving to close the valves, and also as a means to keep said valves in place. Also, the construction of the piston with the concave cleft plate, in combination with the packing disks or rings, and double adjusting piston rod.

268. BRACE POST FOR FIELD FENCES; Cornelius Quackenbush, Huron, New York.

Claim—The arrangement of the supporting braces and connecting brace, pivoted together and combined with the fence sections in such a manner that the weight of the fence continually acts in firmly supporting and clamping together the sections.

269. HARVESTERS; Wm. and Thomas Schnebley, Hackensack, New Jersey.

Claim—1st, The arrangement and combination of the pendulous lever and slide with the scolloped wheel, as described. 2d, Securing the frame to which the finger-bar is attached to the main frame, by means of the universal joint and the bar fitted in the guide on the main frame, or an equivalent arrangement, so that the sickle may rise and fall bodily to conform to the inequalities of the surface of the ground, and at the same time be rendered capable of being placed directly over the main frame to facilitate the transportation of the machine.

270. Stop Gate for Canals, &c.; J. W. Sprague, Rochester, New York.

Claim—1st, The use of the revolving frames, and their combination with the cross timbers and with the planks. 2d, The use of the revolving lever in connexion with the check chain, as described.

271. Crimping Boot Soles; Bradford and Lorenzo Stevens, Stoughton, Massachusetts.

Claim—The crimper made of the bifurcated and grooved block, or its equivalent, and the holders applied thereto, as specified.

272. Corn Shelling Machines; G. W. Tolhurst, Liverpool, Ohio.

Claim—The combination of the spur-wheels with the levers or jaws, these several parts being constructed in the manner specified.

273. Straw Cutters; Peter Van de Sande, Assignor to self and Martin Vanderwerf, Rochester, New York.

Claim—Operating the feed rollers by means of the worm on the shaft of the cutter wheel, when combined with the adjustable feed gate, pressure plate, and weighted lever, for regulating the pressure of the feed, and preventing the choking of the rollers, and keeping the straw uniformly compressed at the point of cutting during the progress of the knife, as set forth.

274. Seeding Machines; John W. Vandiver, Shelbyville, Missouri.

Claim—The bars or rods pivoted within the said conveying tubes and having elastic plates attached, the upper ends of said bars or rods being connected with the vibrating plates of the seed distributing device, as set forth.

275. Propeller; Washington Van Dusen, Philadelphia, Pennsylvania.

Claim—The arrangement and combination of the frame, block, paddles, cranks, rods, and slots, substantially as described.

276. Apparatus for Hoisting and Storing Ice; H. Van Steenburgh and Joel Egnor, Catskill, New York.

Claim—The method of transporting ice upon inclined planes by carrying the ice up between parallel endless chains, having bars extended between said chains to hold the ice and propel the same—the planes being pierced with openings, for the passage of the ice to the successive stories of the ice-houses, and the propelling bars being so arranged that the descending bars shall not interfere with the free passage of the ice through the openings in the plane. Also, the use of the hatches described, to close the openings in the plane, in order to permit the ice to pass beyond a lower to an upper story of the ice-house, substantially as described.

277. Machine for Plating Nail Heads; Wm. H. Van Gieson, Newark, New Jersey.

Claim—1st, Combining the stop pawl, f', of the intermittently die table, J, with the dog, c, which give motion to the said table, by means of a link, f 3, applied to produce the operation of the dog, in combination with the pawl and the two series of ratchet teeth on the said table, to lock the table. 2d, The pair of receiving jaws with their cavity, to receive and retain the nail while they are closed, applied and operating in combination with the nail feeder and the intermittently rotating die table. 3d, The combination of a shaking apparatus for bringing the shells rim-upward, and a curved conductor for overturning them in their passage through it, to permit and ensure the deposit of the shells crown-upward in the dies. 4th, The combination of the pincers and the plunger in relation with the conductor, to take the shells therefrom and deposit them in the dies. 5th, The combination of the discharging plunger and the stationary hood, having a descending spout, with the intermittently rotating die table. 6th, The stop motion consisting of a feeding rod suspended from a spring-catch attached to the bar, which throws the machine in and out of gear, and operated by means of a cam on the main shaft acting on a spring connected with said rod, in combination with a stationary stop, or its equivalent. 7th, The arrangement of the nail-feeding apparatus, the shell-feeding apparatus, the shell-closing punch, the discharging apparatus, and the stop motion relatively to the intermittently rotating table, substantially as described.

278. Manufacture of Hard Rubber; T J. Mayall, Roxbury, Assignor to self and G. N. Davis, Boston, Mass.

Claim—The use of olive oil when incorporated with other materials in the manufacture of hard vulcanized rubber, as described.

279. Air Engines; H. M. Paine, Worcester, Massachusetts.

Claim—The simultaneous moistening and refrigerating of the air previous to its entrance into the pump, in combination with the modifying valve, substantially in the manner described.

280. Hinge for Window Blinds; Thomas E. Williams, Washington City, D C.

Claim—The catch bar and catch, in combination with the cavities and hinge, substantially in the manner described.

281. Cultivators; Wm. Wilmot, Wilmington, Delaware.

Claim—The arrangement and combination of the bars, G G 1, G 2, bars, H, adjustable weights, chains, bars, I, and handles, as described.

282. Machines for Distributing Guano and other Fertilizers; Elijah Wagner, Westminster, Maryland.

Claim—The combination of the stirrer and the feeder, operated in different directions and at different speed, the two being arranged in the manner specified.

283. Railroad Car Brakes; Asa D. Whipple, Elmira, New York.

Claim—I do not claim the manner of securing the armature to the shaft, by means of a loose collar and bar—but I do claim them in combination with the spring for a new purpose, viz: a mode of varying the intensity of the connexion of the armature with the shaft, and allowing that connexion to give way when the resisting force is sufficient to prevent the car wheels revolving and causing them to slide. Also, the method of communicating the motion of the car wheels to their brakes through the medium of electro-magnetism, consisting substantially of the spring jaws, and of the insulated rings on the axis of the magnet, arranged and operating in combination with the said magnet and adjustable armature, in the manner specified.

284. Hay and Cotton Press; Henry Barnes, Blairsville, Assigner to self and N. G. Macrum, Pittsburgh, Pennsylvania.

Claim—The arrangement and combination of the geared eccentric, inclined rack, and follower rod, substantially as described.

285. Restoring Waste Vulcanized Rubber; H. L. Hall, Beverly, Massachusetts, Assignor to the Beverly Rubber Company.

Claim—The method of restoring waste vulcanized rubber, by grinding it to a fine or powdered state, or

otherwise, then submitting the same in a close or proper vessel to the action of steam direct upon the rubber or in connexion with water for the space of forty-eight hours, more or less.

286. SEWING MACHINES; Charles Raymond, Brattleborough, Vermont, Assignor to Williford H. Nettleton, Bristol, Connecticut.

Claim—The arrangement of the adjustable rack having a reciprocating and vibrating motion, and operating in combination with the pinion and feeding wheel to regulate the feed, in the manner described. Also, the slide, H, carrying the looper, and provided with the slot, receiving the pin on the bar that is formed with the carrier for the second thread, whereby the thread carrier is actuated by the reciprocations of the looper, in the manner specified.

287. WEAVERS' SHUTTLES; N. J. Willis, Lawrence, Mass., Assignor to S. Chase, Brooklyn, New York, and G. A. Fuller, Lawrence, Massachusetts.

Claim—The manufacture of weavers shuttles, made of separate nose blocks and a hard rubber or indurated vulcanized caoutchouc shell or body, or equivalent, cast or moulded on the nose blocks, in the manner described.

288. MACHINES FOR CUTTING DOVETAIL MOULDINGS; Solander Withington, St Louis, Missouri.

Claim—The combination of the saws, I' I and J' J, with each other and with the two saws, K' K, in the manner described, the two saws, J' J, being set in a diagonal plane. Also, adapting and arranging the carriage, C, with the described combination of saws, for the purpose specified. Further, the arranging of three saws, K', I', and J', in the carriage, B, by which the machine is adapted to cut the different lengths of stile.

DISCLAIMER.

1. VESSELS FOR HOLDING LIQUIDS; James H. Stimpson, executor of James Stimpson; patented October 17, 1853; disclaimer dated November 16, 1858.

I disclaim so much of the first claim of said patent as may include the application of the double wall to other structures or vessels than ice pitchers.

ADDITIONAL IMPROVEMENTS.

1. METHOD OF ATTACHING LAMPS TO LANTERNS; John Fleming, Pittsburgh, Pennsylvania; patented July 6, 1858; additional dated November 2, 1858.

Claim—The improved arrangement described, the same consisting in the attachment of the spring and clips to the lamp case, instead of to the lantern.

2. PROPELLER; Henry Link, Little Falls, New York; additional dated November 16, 1858.

Claim—The wings made up of a series of horizontal hinged valves graduated in width, as described, in combination with the cylindrical section, either hollow or solid.

3. COTTON GIN FEEDERS; Jedediah Prescott, Memphis, Tennessee, late of Rockford, Illinois; patented Oct. 13, 1857; additional dated November 30, 1858.

Claim—The endless apron, revolving adjustable toothed bar, rotary bush and toothed cylinder, and grating, combined as set forth.

RE-ISSUES.

1. MODE OF GENERATING HEAT; T. R. Hartell, Assignee of Wm. Hartell and Joseph Lancaster, Philadelphia, Pennsylvania; patented Nov. 23, 1852; re-issued Nov. 2, 1858.

Claim—The adaptation of, or rendering available, tar, as a fuel for the production of the intense and steady heat required for the melting of glass, and for other processes and manufactures, by introducing water or the vapor of water into a furnace or fire-place, in contact, combination with, or in close proximity to the tar, substantially as set forth.

2. SEWING MACHINES; I. M. Singer and E. Clark, Assignees of John Batchelder, City of New York; patented May 8, 1849; re-issued November 2, 1858.

Claim—The combination of mechanism, so that the cloth or fabric to be sewed being placed upon the machine will be automatically fastened on to the feeding apparatus, carried forward to receive the stitches, and discharged from the feeding apparatus, and so that seams of any desired length may conveniently be sewed.

3. CORN HARVESTERS; E. C. Manck and W. T. McGahey, Conrad's Store, Virginia; patented April 22, 1856; re-issued November 2, 1858.

Claim—1st, The rotary arms, p, in combination with eccentric guides, q, substantially in the manner specified. 2d, The employment of a double series of cutters, for cutting stalk and stump.

4. FURNACE FOR BURNING BAGASSE; Elizabeth Ann Harris (late Stillman), City of New York, Administratrix of Alfred Stillman, deceased; patented May 1, 1855; re-issued November 9, 1858.

Claim—1st, The employment, in connexion with the boilers or other vessels of a sugar plantation which require heat, and with the mill for expressing the juice from the cane, of a furnace, constructed substantially in the manner set forth, capable of burning wet bagasse without the aid of other fuel than the bagasse itself, and capable also of utilizing thereby said bagasse as a generator of heat for said vessels. 2d, Combining the cane mill with a furnace, constructed as described, by means of the endless carrier.

5. TREATMENT OF CAOUTCHOUC; A. G. Day, Seymour, Connecticut; re-issued November 9, 1858.

Claim—Running the heat for vulcanizing flexible and elastic hard gum compounds, through the range of temperature, and the comparatively great length of time—that is to say, commencing the heat at about 275°, and carrying the same to 300°, and upwards. Also, making the flexible and elastic hard gum composition of two parts, by weight, of rubber or other vulcanizable gum, and one part of sulphur, when such composition is preparatory to the running of the heat, as described. Also, equalizing the temperature in the heating apparatus by mechanical means.

6. AUTOMATIC STEAM WHISTLES IN LOCOMOTIVES; James Harrison, Jr., City of New York, formerly of Milwaukie, Wisconsin; patented April 1, 1856; re-issued November 9, 1858.

Claim—1st, Giving audible indications of the approach of the train of cars to persons at the stations or other points on the route, by an arrangement of means interposed between the truck wheels and whistle, and which are actuated by the truck wheels. 2d, Combining with the means of giving audible indications, other means for giving visible indications to persons charged with the care of the train, both sets of means being

actuated by the truck wheels. 3d, Varying and modifying the tones or sounds of the whistle by the form and surface of the lifters and their arrangement and position upon the cylinder.

7. STOVES; Joseph C. Henderson, Albany, New York; patented May 18, 1858; re-issued November 9, 1858.

Claim—The new radiating combustion chamber with a conducted orifice or throat producing a plenum in said chamber, in combination with a fire-box or pot, and with an exterior chamber surrounding said combustion chamber, and from which exterior chamber the heat is taken by radiation or conductor, substantially as set forth.

8. SEED PLANTERS; Jarvis Case, Bloomington, Illinois; patented January 16, 1855; re-issued November 16, 1858.

Claim—In combination with a corn planting machine that is constantly moved over the ground, and drops the grain intermittently, the so combining of two slides, one of which is at or near the seed hopper, and the other at or near the ground, or their equivalents, with a lever, as that the operator or attendant on the machine can open said slides at the proper time to deposit the seed, and prepare a new charge by the double dropping, as specified.

9. PRINTING PRESS; George P. Gordon, City of New York; patented June 13, 1854; re-issued November 16, 1858.

Claim—Relieving the sheet from the type, and taking the sheet directly from the platen, or either of them, with or by the same nippers, which shall carry such sheet to its place of deposit or piling. Also, giving, with one inking cylinder, two distributions to the inking rollers for each impression, viz: one distribution prior to passing the form, and one distribution prior to the return of the form to its first position. Also, the arrangement of the spring, connecting rod, crank, and stops, as described, to operate the bed and give the necessary dwell for the impression.

10. GRINDING MILLS; Edward Harrison, New Haven, Connecticut; patented June 6, 1854; re-issued November 16, 1858.

Claim—The method of securing the runner stone on the driving spindle in a grinding mill, by means of a metallic band, or its equivalent, embracing the periphery of the stone, by combining said band with a hub, and a back plate of at least as great diameter as the runner, and rigidly attached to the spindle, such combination operating to secure the stone firmly in its place.

11. WOOD SCREWS; The Eagle Screw Co., Assignees of Thomas J. Sloan, Providence, Rhode Island; patented August 20, 1846; re-issued November 23, 1858.

Claim—1st, Making the core with a conical point, in combination with the body of a cylindrical form, or nearly so. 2d, Making the core with a conical point, in combination with the thread formed on such conical point of a gradually less depth as it approaches the apex of the core, and with the several convolutions on the body, at equal distances apart. 3d, Making wood screws with the core or a conical shape along that part of the length of the screw extending from where the thread begins on the shank, to where it becomes of full depth. 4th, Making wood screws with the core of a cylindrical, or nearly cylindrical, form, and with a conical point, in combination with the thread of equal pitch along the conical point and body, that is, with all the convolutions at equal distances apart, and of gradually less depth from the base to the apex of the core.

12. REDUCING THE FRICTION OF JOURNALS OF AXLES ON RAILWAYS; J. K. Denning, City of New York, Assignee of Leon Joseph Pomine De Mirimondi, Paris, France; patented August 23, 1856; re-issued November 23, 1858.

Claim—The arrangement for the semi-boxes for resting on the journals of the friction rollers within the upper part of the main part of the main journal box, and entirely enclosed within the said main box, in combination with the axle journal on which the rollers rest to sustain the load. Also, taking the lubricating matter from the looser part of the main box, and applying it to the journals of the rollers by the projections at the ends of the axle journals. Also, the method of lubricating the journals of the rollers, and the periphery of the axle journal and the rollers, by the projections on the axle, which in rotating take the lubricating matter from the reservoir in the main box, and apply it to the journals of the rollers above, that the drippings therefrom may lubricate the periphery of the rollers and axle journal, substantially as described.

13. WATCH CASES; Elihu Bliss, Newark, New Jersey; patented April 13, 1856; re-issued Nov. 23, 1858.

Claim—Arranging the push piece which passes through the pendent, in combination with the pin, and so as to operate the spring catch to the closed bizzle of the outer case, when the face of the watch is in either position, as set forth. Also, arranging the case of the watch which contains the movement, and which carries the dial within a surrounding ring or rim, so that it can be turned within the said ring and in the plane thereof. Also, arranging the journals by which the body of the watch is attached to an outer case, and on which it turns reversed, so as to leave the works of the watch free to be shifted in its surrounding ring, substantially as described.

14. SAW MILLS; Hazard Knowles, City of New York; patented Sept. 28, 1852; re-issued Nov. 30, 1858.

Claim—So guiding the movements of the saw as to cause it to advance in the line of its plane as it descends, for the purpose of properly distributing amongst the teeth of said saw, the cutting action which may be exerted thereby upon the material operated upon. Also, arranging the ways of the saw gate in such a manner with relation to the feeding apparatus, that the amount of feeding movement imparted to the carriage will always be in perfect harmony with the amount of cutting action exerted by the saw. Also, arranging the compound parts of my improved saw mill, in such a manner that the amount of cutting action exerted by the saw can be speedily varied whilst it is in motion, from its maximum performance down to nothing, and vice-versa.

15. CHURN; James Macnish, Berlin, Wisconsin; patented April 20, 1858; re-issued Nov. 30, 1858.

Claim—Expressing the butter from the globules or sacks of milk or cream by friction, such as rubbing, washing, or grinding, when accomplished in any manner equivalent to that specified.

16. FELTING FOR COATS, HATS, &c.; M. Osborne, City of New York; re-issued November 30, 1858.

Claim—The method of manufacturing articles of wearing apparel, of which wool or other similar animal fibre constitutes a larger part, as set forth.

DESIGNS.

1. STOVES; E. J. Cridge, Troy, New York; dated November 2, 1858.

2. STATUES OF HENRY CLAY; T. Ball, Boston, Massachusetts, Assignor to G. W. Nichols, City of New York; dated November 9, 1858.

3. STOVES; L. D. Thomas, North Dighton, Massachusetts, Assignor to the Dighton Furnace Company; dated November 9, 1858.

4. HAT AND CANE STAND; Edward Reynolds, Assignor to Thomas W. Brown, Boston, Massachusetts; dated November 16, 1858.

5. COOKS' STOVE; A. C. Barstow, Providence, Rhode Island; dated November 16, 1858.

6. SCRIPT TYPE; James Conner, City of New York; dated November 16, 1858.

7. STOVE PLATES; Samuel D. Vose, Albany, New York; dated November 23, 1858.

8. IRON FENCES; Edwin Gomez, City of New York; dated November 30, 1858.

DECEMBER 7.

1. COOKING STOVES; Federal C. Adams and Joseph Peckover, Cincinnati, Ohio.

Claim—In combination with the smoke passages formed by the single vertical and inclined partition, arranged with regard to the exit aperture, as described, the admitting of air under the grate into the air spaces, and from thence into the smoke passages, by means of the perforations in the lip or flanch of the back lining plates of fire-box.

2. EXTENSION TABLE; Adolphus Bader, City of New York.

Claim—The arrangement of additional plates in arms of such a shape and form that by drawing out the arms the plates are brought to a level with the top of the table. Also, confining these arms at the proper places by means of the notches and the hook, and to guide the same by means of pins and notches.

3. SEWING MACHINES; Robert M. Berry, City of New York.

Claim—The combination and arrangement of the feeding foot of cork, or its equivalent, with the peculiar feeding mechanism described, or its equivalent.

4. SEWING MACHINES; Hobert H. Bishop, Bristol, Connecticut.

Claim—The plate in slides on the needle bar at right angles to it, and carrying the eye-pointed needle, in combination with the bent lever and stops, or their equivalents.

5. WASHING MACHINE; Jesse Bowen, Yellow Bud, Ohio.

Claim—The alternating rotation of the tub in one direction, and the similar rotation of the rubber in an opposite direction, by means of the levers, racks, and pinions, arranged as set forth.

6. SEED PLANTERS; Jarvis Case, Bloomington, Illinois.

Claim—1st, Dispensing with side rails and connecting the front and rear truck by the driver's seat, hinged to the front truck, and rigidly secured to the rear one. 2d, The so arranging of a reversible marker upon the front truck of the machine, so that when planting the runner shall not touch the marker arm; but when said front truck is raised up to turn the machine around, the runner shall catch and raise up and hold up said marker. 3d, In the construction of the runner, the hollowing out for the marker arm, the forming of the seed ducts in the sides of the runners, and so inclining the straight edge thereof as that its heel shall be the lowest point.

7. RAILROAD CAR BRAKES; Henry E. Chapman, Albany, New York.

Claim—The arrangement of the shaft, L, having upon it the right and left-hand screw threads, the right and left-hand nuts, the rods, the levers, I I', the shafts, H H', the levers, G G', and the cross-bar, in their relation to each other and to the brake, as set forth.

8. BURNERS FOR LAMPS; M. B. Dyott, Philadelphia, Pennsylvania.

Claim—Regulating the light of a gas lamp by raising and lowering the heater and pin connected to it, while the head of the burner remains stationary. Also, in combination with the heater and burner, the valve or projection on the one, and the valve seat on the other, when the said valve and seat are located between the top of the wick and the openings at which the gas is burned.

9. MACHINE FOR CUTTING STAVES FROM THE BOLT; Isaac W. Forbes, Jefferson, Wisconsin.

Claim—The arrangement of the hinged platform and its latch bolt in such a manner with relation to the concaves and the knife of the cutter head, that the said parts can be operated substantially in the manner set forth.

10. HORSE RAKES; Christian Garver, Londonderry Township, Pennsylvania.

Claim—The arrangement of the cross-piece, staples, parallel arms, slots, and pins, with rake, in the manner specified.

11. CORN HARVESTERS; Bronson Murray, Ottawa, and John Van Doren, Farm Ridge, Illinois.

Claim—In combination with the inclined knife or cutter, the curved guides or arms, for bending over and thus facilitating the cutting. Also, in combination with the stationary cutter, the reciprocating cutter, when operating together in the manner set forth. Also, in combination with the cutting and guiding or directing apparatus for severing and dropping the stalks, the shovers for moving them rearward. Also, the arranging of the conveying apron upon removable supports, and so inclining it that it will convey the stalks over or past the opening, J, behind it, when used, but leave a delivery at J when removed.

12. COMPOSITION FOR PURIFYING GAS; Paul B. Goddard, Philadelphia, Pennsylvania.

Claim—The use of lime dissolved in a saccharine solution, whether combined or not with other substances.

13. HORSE RAKES; John W. Hadcock and Parker Wilcox, Norway, New York.

Claim—The arrangement of the rake teeth with the metal point or shield, as described.

14. WASHING MACHINE; John G. Haley, Isaac Wilson, and Jackson Lyon, Cameron, Illinois.

Claim—Making the spaces between the edges of the slats of the washboard of a width different from that of the spaces between the edges of the slats of the cylinder, and allowing the slats of each to interlock or mash and slip upon each other, for the purpose of causing the clothes to move or change their position in the wash-box whilst they are undergoing the rubbing process.

15. HARVESTERS; Henry Opp, Belleville, Illinois.

Claim—The employment of the plate, operated as described, in combination with the bar, J, or its equivalent, attached to the finger-bar, G.

16. WROUGHT NAIL MACHINE; Adrian V. B. Orr and Gideon Bantz, Frederick, Maryland.

Claim—1st, The dies, constructed in the manner described, and when acting simultaneously, in combination with the heading swage upon the heated bar, as specified. 2d, With the said header and dies, the use of the elongated tweer, opening in the manner set forth.

17. LIME-KILNS; Clark D. Page, Rochester, New York.

Claim—The construction of the cupola with the sectional form shown in fig. 2, combined with the arrangement of the flues, as described.

18. SEWING MACHINES; Samuel F. Pratt, Roxbury, Massachusetts.

Claim—For interlooping two threads in order to sew cloth or other material, by means of an eye-pointed needle, or its equivalent, the combination of a thread carrier or adjuster and a hook, so acting together and with the eye-pointed needle, or its equivalent, as not only to cause the thread of the carrier to be laid or presented in rear of the needle in a proper manner to be seized by the hook, but to cause the hook to pass through the loop of the needle, seize the thread of the carrier, and next recede and draw the said thread in the form of a loop through the loop of the needle, and properly present it for the needle to pass through it during its next downward movement, after the cloth may have been fed along the length of the stitch. Also, the thread carrier constructed with the slit, or its equivalent, and barb, operating in the manner described, to present the lower thread to the reciprocating looper hook, which will draw it through the loop formed in the needle thread.

19. METHOD OF MEASURING AND RECORDING BY THE TAPE; E. A. Preston, Battle Creek, Michigan.

Claim—The described arrangement of a tape measure, whereby the same is made self-registering by means of the drum, the pawl, and the ratchet wheel, in combination with the spring arranged in the barrel, and with the pinions and the wheels.

20. PLATFORM SCALES; Elnathan Sampson, St. Johnsbury, Vermont.

Claim—The arrangement of the stationary frame, descending and sliding platform, rising frame, descending arm, and weighing beam, when the whole is combined by means of links and knife edge bearings, and arranged as described.

21. AMALGAMATOR; Lewis Solomon, City of New York.

Claim—1st, The use of elongated amalgamating chambers, when arranged to operate in the manner specified. 2d, The arrangement of the amalgamating chambers within a heated chamber, for the purposes specified.

22. WATER-PROOF CORK COMPOSITION; Andrew Stevens, City of New York.

Claim—Granulated cork that is covered and impregnated with the composition specified.

[By impregnating and coating granulated cork with a solution of a gum in alcohol and certain essential oils, it is rendered less susceptible of absorbing moisture, and better adapted to the purposes of filling the quilted linings of overcoats, jackets, mattresses, and other articles of a like character, intended for life-preservers; and also imparts to them a peculiar and pleasant odor, which is, however, so distasteful and injurious to bedbugs and other vermin, as to keep them entirely away from the articles so impregnated.]

23. GUARD FOR CIRCULAR SAWS; Reuben S. James, Bethel, Vermont.

Claim—The shield with blade arranged with or without tongue, for circular saws, operating substantially as described.

24. BURNERS FOR LAMPS; Josee Johnson and Frederick Bailey, City of New York.

Claim—The combination in a lamp of the tubes, glass tubes, and barrel, in the manner set forth.

25. GRAIN AND GRASS HARVESTERS; M. G. Hubbard, Penn Yan, New York.

Claim—The attachment of the front corner of the reaping platform to the corner of the machine, by means of the hinge, constructed as set forth. Also, the elastic connexion between the reel and driving power, in combination with the flexible attachment of the outer reel arm. Also, the employment of the self-sustaining raising lever, when constructed as specified. Also, supporting a portion of the weight of the outer end of the platform by means of the spring, or its equivalent.

26. SEALING PRESERVE CANS; Allen Taylor, Baltimore, Maryland.

Claim—The forming of the gutter-shaped rim which supports the sealing cement of a porous or textile substance, said substance being applied to the downwardly bent edge of the cover, and forming with said edge a V-shaped gutter, in which the cement when melted will be confined, yet allowed to come in contact with the metal surface, and thus seal the cover to the can with a small expenditure of cement, and in such a manner that the cover can be readily unsealed without cutting up and wasting the cement, as when other modes of sealing are adopted.

27. EDGE KEYS FOR BOOTS; George C. Todd, Lynn, Massachusetts.

Claim—The shank, in combination with the disk so attached to the side of it that the angle of inclination of the disk to the shank may be varied as required.

28. PREVENTING INCRUSTATION OF STEAM BOILERS; John Warren Harnett, Cincinnati, Ohio.

Claim—The means and manner specified of injecting oil, or other fatty matter, in a liquid state, into the boiler, for the purposes set forth, whereby the said oil or other fatty matter is fed to the boiler simultaneously and in connexion with the water, as described.

29. STOVES; Charles Hartwell, Boston, Massachusetts.

Claim—In connexion with the evaporating vessel, or its equivalent, for supplying vapor to the air, the described arrangement of the parts of my stove, consisting of the fire pot, lower chamber, receiving pipe, tubes, and oven, or other cooking vessel, arranged in the manner described. And in connexion with the above, the aperture leading from the interior of the case to the ash pit.

30. WATCH CASES; Auguste Lachat, City of New York.

Claim—The method of constructing a "magic" watch case, substantially as described. Also, making the head of the push pin movable, in the manner set forth.

31. SEWING MACHINES; John Mackenzie, Cleveland, Ohio.

Claim—Combining the lever-like feed dog with the revolving eccentric pin, which operates the shuttle by means of the vibrating, slotted, double cam-like plate, and the two levers, the connecting rod and the springs, arranged as described, to produce the movements of the feed dog.

32. Saw Set; **Edward Marshall, City of New York.**

Claim—The described method of setting saws, whereby the saw is firmly clamped and held in the slot by means of claws, while the tooth is being bent or set, the saw being alternately clamped and released as the teeth are successively set.

33. Furnace for Melting Iron; **Wm. McFarland, St. Louis, Missouri.**

Claim—The combination of a reservoir with a cupola furnace, so as to collect the metal as fast as melted, substantially as set forth.

34. Life Berth for Vessels; **James P. McLean, City of New York.**

Claim—The arrangement of the removable bed or bottom, canvass joints, lockers, oar and signal compartment, air tubes, and the projections, grooves, and plates, combined in the manner described.

35. Door Latch; **Henry Hackman, Jr., Pequa, Pennsylvania.**

Claim—The revolving bolt, the lever arms, peg, coiled spring, the shouldered shank, and spring catch, when combined as described.

36. Bustles; **Charles A. Postley, Jersey City, New Jersey.**

Claim—The combination of adjustable hoops and adjustable waist ribs, arranged in the manner described, so that the size of the bustle and the position of the hoops may be varied to suit the wearer.

37. Device for Supporting Furniture Casters; **Henry E. Richards, Newark, New Jersey.**

Claim—The arrangement of the concavity, A, and the points, B B B, substantially as described.

38. Saw Sets; **I. P. Vanvleck, Cooksville, Wisconsin.**

Claim—The hammer head operated from the treadle through the medium of the bar, springs, and arm, in connexion with the anvil and gauge, arranged substantially as set forth.

39. Mode of Opening and Closing Farm Gates by Approaching Vehicles; **Caleb Winegar, Union Springs, New York.**

Claim—1st, The combination only of two or more capstan rollers. 2d, The operating of gates by means of winding up the weight, or equivalent spring, with the wheel of a carriage, or by lever, each time in passing and re-passing the gate, sufficient to open or close the gate or gates.

40. Spindle for Throstle Spinning; **C. E. Brown, Assignor to self, John Tenney, and John Rhodes, Millbury, Massachusetts.**

Claim—The combination and arrangement of the stationary socket spindle, the loose spindle, and the reversed flyer and whir, when constructed in the manner described.

41. Billiard Table Cushion; **J. E. Came, Assignor to self and James E. Came, Boston, Massachusetts.**

Claim—My improved mode of making a billiard table cushion, viz: of a vulcanized caoutchouc body, a thin facing of hickory, or its equivalent, and a covering thereto of water-proof cloth, or other material, the whole being applied together and covered with one or more layers of cloth, substantially as described.

42. Sewing Machines; **John Frost, Assignor to self and James Frost, City of New York.**

Claim—The employment of the slotted arm, the rod, and pin, and the swiveling guide, or their respective equivalents, in combination with each other and with the crank, substantially as described, for the purpose of communicating the requisite irregular motion to the needle bar of a sewing machine.

43. Vulcanized Rubber Goods; **H. L. Hall, Beverly, Massachusetts, Assignor to the Beverly Rubber Co.**

Claim—The improvement in the manufacture of rubber goods of every description, which consists in combining fibrous materials with waste vulcanized rubber rendered soft and plastic in the manner described, whether such fibrous materials be such only as are found in old or waste vulcanized goods or fabrics, or new fibrous materials added to the rubber compound.

44. Securing the Arms to the Hubs of Propellers; **H. O. Perry, Assignor to self and Sidney Sheppard, Buffalo, New York.**

Claim—The employment of the conical ends confined in the corresponding sockets by the keys, substantially in the manner set forth.

45. Valves for Gas Metres; **R. M. Potter, Assignor to Wm. Mackenzie, Assignor to R. M. Potter, City of New York.**

Claim—The eccentric sliding valve, when constructed, arranged, and operating substantially as described.

46. Saw Mill; **S. R. Smith and P. P. Lane, Assignors to Lane & Bodley, Cincinnati, Ohio.**

Claim—1st, The longitudinal rack bar, combined as described, with the segment wheel, pinion, and accessory rack, so as to admit of the head blocks being placed in gear at any required distance asunder, without disconnexion or adjustment of parts. 2d, The described arrangement of the collar, box, cushions, and temper screws, whereby the saw may be fixed rigidly in any position or allowed lateral play to any desired extent, and return automatically to its normal plane when released, and by means of which the position of the said normal plane may be varied at pleasure. 3d, The perforations applied to the transverse racks, in the manner explained.

47. Sewing Machines; **S. G. Tylor, Assignor to self, G. J. Savage, and J. W. Barnum, Quincy, Illinois.**

Claim—Making the bearing surface of a feeding foot or pressure pad of a sewing machine, or their equivalents, with two or more parts or toes, each self-adjusting to varying thicknesses, or inequalities of surface, cording, hemming, or sewing plain work, and combining the same with a sewing machine feeding apparatus, substantially as specified.

48. Burners for Vapor Lamps; **E. M. Williams, Assignor to self and John Gabel, Philadelphia, Penna.**

Claim—The supplemental sliding wick tube, arranged relatively with one or more vapor tubes, to operate substantially as set forth.

49. Preventing Explosions in Steam Boilers; **Jane H. Lloyd, executrix of R. L. Lloyd, deceased, late of Philadelphia, Assignor to G. P. Perry, of said Philadelphia, Pennsylvania.**

Claim—Placing within a steam boiler a metallic conductor, arranged to communicate with the outside of the said boiler, substantially in the manner set forth, in order to maintain an electrical equilibrium between the inside of the boiler and the outside thereof, or with any matter surrounding or in connexion therewith, for the purpose specified.

ABSTRACTS OF SPECIFICATIONS OF RECENT PATENTS.

Two Patents granted, January 11, 1859.

Palmer's Patent Arm and Hand.

FURNISHED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Fig. 1, represents an arm to be applied above the elbow. The articulation A B, is a ball and socket, connected by the steel plates C C, and turning upon the pinion D. The functions of the bones in the fore-arm (Radius and Ulna,) are imitated by the conical shaft E, which terminates in a ball at the elbow and wrist J J. The wrist is articulated with a ball and socket firmly united by catgut tendons F G H tensely drawn over the convexity of the shaft E at the elbow. It has every motion of the natural wrist. The hand rotates on the fore-arm, being susceptible of pronation and supination, or any angle or degree of flexion and extension desirable. The extensor tendons K L M N O acting with the springs 1, 2, 3, 4, 5, open the hand. The detached ball and socket joints of the thumb and fingers are indicated by the figs. 1, 2, and 1, 2, 3.

The fingers are articulated on steel rods and pinions imitating the bones, as seen in the thumb and the first and third fingers. The exterior is brought to a perfect imitation of the natural arm (as shown in the outline, or in Fig. 5,) by a soft elastic substance, which rotates around the fore-arm, preserving anatomical symmetry in every position. It is covered with a delicate skin.

Fig. 2, is the same arm extended, with the fingers semi-flexed. The belt A attaches the arm to the body. The small belt C C 2, is connected by a tendon to a clasp and pulley D E. The great muscle F is the continuity of the flexor tendons G H I J K. These tendons pass sinuously over pulleys, or fixed sheaves, 1, 2, 3, 4, 5, through the hand, to the end of the fingers and thumb. The principles of the lever and pulley are thus *combined*, and the *maximum power* retained at all angles of flexion or extension. A slight motion of the shoulders, with extension of the fore-arm, produces an incredible grasp, as seen in Fig. 3.

An object of any shape, such as a pen, a fork, or an apple, is held with facility. By a slight motion of the shoulders the belt A B causes the great muscle F and its tendons, to contract *powerfully*, closing the hand. A movement easily and naturally made actuates the tendon CC, and fastens the clasp D upon the muscle, so as to retain the grasp in any position or motion of the arm when in use. This is regarded as invaluable for holding reins in *driving*, or carrying articles with *safety*. An easy counter motion *unfastens the clasp*, relaxing the flexor muscle and its tendons, and the extensors open the hand. This principle performs most perfectly in arm applied below the elbow as in Fig. 3.

Fig. 3. In this are seen the belt A B C, the great muscle F and its tendons, the clasp and pulley D E as in Fig. 2. A fixed eyelet F 2, clasps the great muscle F, and thus guides the flexor tendons of the fingers. The line 1, shows the union of the natural with the artificial arm.

Fig. 4, shows a hand holding a fork. The tendon A A 2, passes through the clasp B and around the pulley C to the side of the clasp D, where it

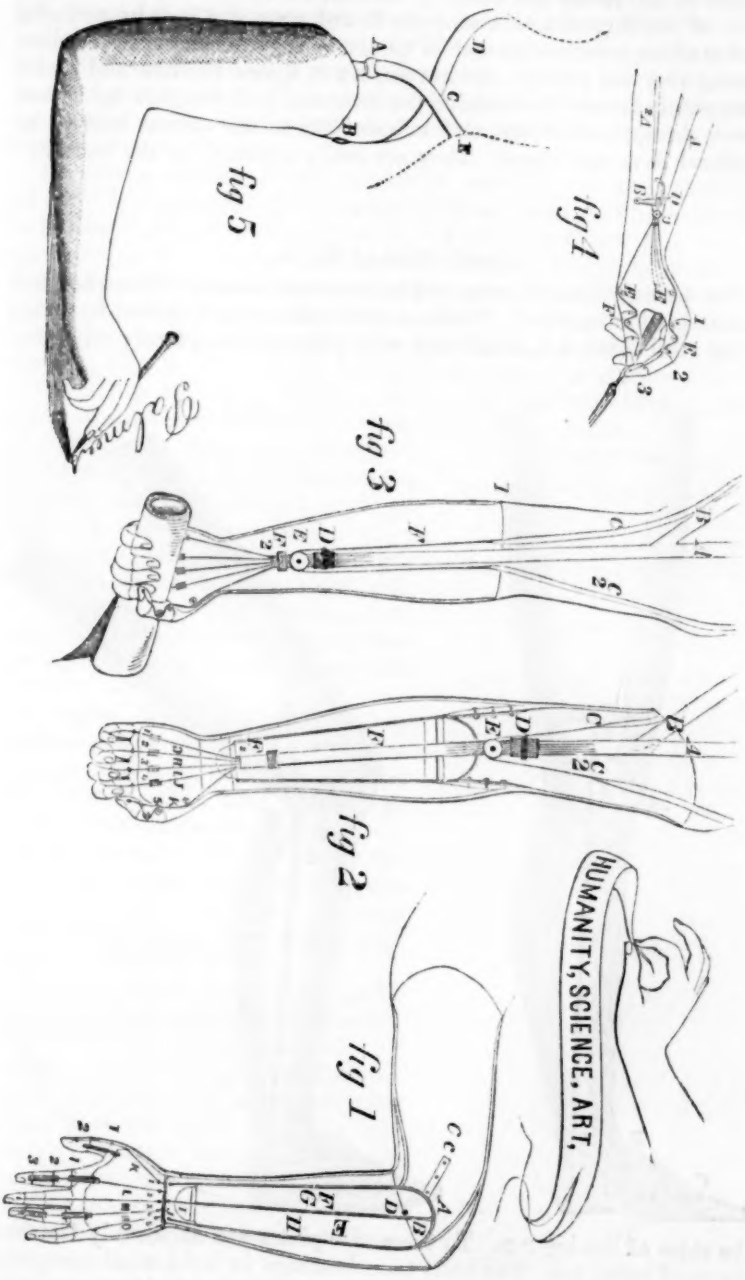


fig 5
fig 4
fig 3
fig 2
fig 1
HUMANITY, SCIENCE, ART.

fastens or *unfastens* the clasp by movements before explained. The joints of the fingers and thumb are flexed upon the fork by powerful tension of the great muscle and its tendons. The sinuosity of the tendons passing over the pulleys, or sheaves, E E E, shows the new and useful principle of effectually combining the lever and pulley to gain the *utmost power*, *strength*, *elasticity*, and *adaptability* to the various uses of an Artificial Arm and Hand. They are easily adjusted by the wearer.

Specification of the Leg.

The articulations of knee, ankle, and toes, consist of detached ball and socket joints, A B C. The knee and ankle are articulated by means of the steel bolts, E E, combining with plates of steel firmly riveted to

Fig. 1.

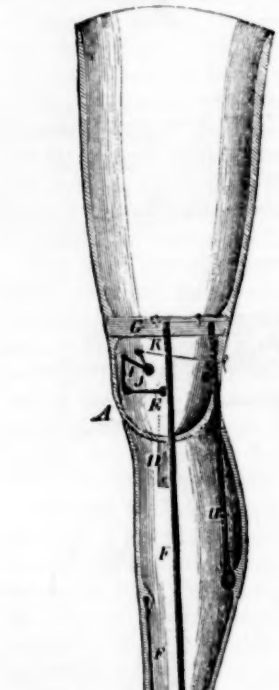
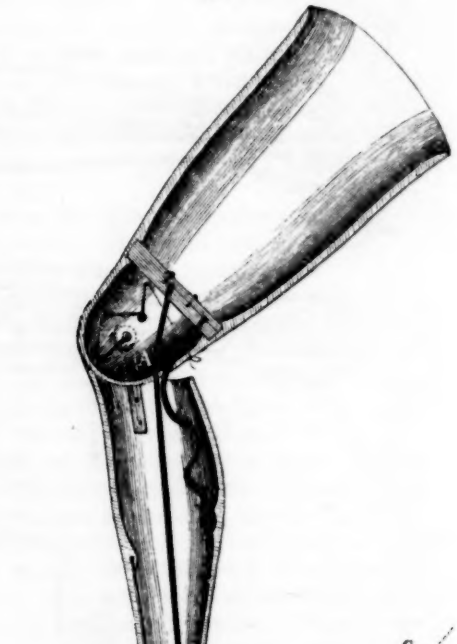


Fig. 2.



the sides of the leg D D. To these side plates are immovably fastened the steel bolts, E E. The bolts take bearings in solid wood (properly bushed) across the *entire diameter of the knee and ankle*, being four-

fold more reliable and durable than those of the usual construction. All the joints are so constructed that no *two pieces of metal move against each other in the entire limb.* The contact of all broad surfaces is avoided where motion is required, and thus friction is reduced to the *lowest degree possible.* These joints often perform many months without need of oil, or other attention, a desideratum fully appreciated by the wearer.

The tendo achillis, or heel tendon, F, perfectly imitates the natural one. It is attached to the bridge, G, in the thigh, and passing down on the back side of the knee bolt, E, is firmly fastened to the heel. It acts through the knee bolt, *on a centre*, when the weight is on the leg, imparting security and firmness to the knee and ankle joints, thus obviating all necessity for *knee-catches.* When the knee bends in taking a step, this tendon vibrates from the knee bolt to the back side of the thigh, A, Fig. 2. It descends through the leg so as to allow the foot to rise above all obstructions, in flexion, and carries the foot down again, in extension of the leg for the next step, so as to take a firm support on the ball of the foot. Nature-like elasticity is thus attained, and all thumping sounds are avoided.

Fig. 3.

Another tendon, H, of great strength and slight elasticity, arrests the motion of the knee, gently, in walking, thus preventing all disagreeable sound and jarring sensation, and giving requisite elasticity to the knee.

A spring, lever, and tendon, I J K, combining with the knee bolt, give instant extension to the leg when it has been semi-flexed to take a step, and admit of perfect flexion in sitting.

A spring and tendons in the foot, L M N, impart proper and reliable action to the ankle joint and toes. The sole of the foot is made soft to insure *lightness and elasticity of step.*

The stump receives no weight *on the end*, and is well covered and protected to avoid friction and excoriation.

These joints, springs, and tendons are all *patented*, and no modification of any part will enable a person successfully to evade the patents, which contain about *twenty distinct and combined claims*, covering nearly the *entire mechanism.* Fig. 3, is a view of Palmer's perfect model.

PALMER'S PATENT LEG is composed of a great variety of such materials as most effectually combine to give a perfect imitation of the

human limb. This combination of substances, all experience has taught, produces a much lighter, stronger, and comelier artificial limb than can be made chiefly of any one material. Wood, metal, gutta percha, and india rubber have all been tried again and again, and been abandoned by all mechanicians who were competent to construct, and also by all experienced wearers of false limbs, who can duly appreciate the qualities of a perfect substitute.

This invention differs radically from all other false limbs, and is fully protected by various patents. It is so symmetrical and life-like in appearance and motion, as to be often mistaken, when in use, for the natural limb. The internal mechanism is so perfectly combined, and the polished exterior so exquisitely colored and finished, that delicate silk hose and slippers may be worn without betraying the work of art.

The external skin, though delicate in appearance, is very strong. It is indissolubly cemented without perceptible seam, and rendered impervious to water by a beautiful skin-tinted enamel, which is rivaled only by the color of the natural skin.

The mechanism is adapted to all forms of amputation, whether above or below the knee, or through the foot, and is successfully applied to the shortest and tenderest stumps. It is attached to the body in a manner which insures entire comfort.

The distinguishing characteristics of this Patent Leg are its life-like elasticity and flexibility, excessive lightness, durability, adaptability, and perfection of external appearance. These elements have been accorded to it by the first Surgeons of America, England, and France, and by nearly three thousand mutilated persons, who are now in the daily use of this Invention.

PALMER'S PATENT ARM is an original invention, which has cost years of study and experiments. It has been duly tested by numerous ladies and gentlemen, and pronounced equal to the Patent Leg.

MECHANICS, PHYSICS, AND CHEMISTRY.

Notice of Mr. L. C. Stephens' Patent Combination Rule.

To the Committee on Publications.

GENTLEMEN:—As all simple and comparatively accurate instruments for the use of engineers and mechanics, whereby they are enabled with facility to make measurements and calculations are of importance, I would call their attention through your *Journal* to a combination rule manufactured by L. C. Stephens & Co., of Pine Meadow, Connecticut. This rule is composed of two arms of 6 inches in length, each folding together by one joint; when folded, it is $1\frac{3}{8}$ inches wide and $\frac{3}{8}$ of an inch thick, and is protected by strong brass binding;—its weight only slightly exceeds the ordinary pocket rule. The combination consists of its having a spirit level let into the upper brass binding of one of the six-inch arms—the glass is let into the rule

and protected by a brass plate put on with screws, and therefore can be removed and replaced in case it should accidentally be broken. There is a steel blade shutting into the other arm, having the axis upon which it moves near the opposite extremity from the joint of the two arms proper. When this blade is opened out from the arm, and is raised so as to form an angle of 90° with said arm, it is prevented from opening further by two stops in the arm, one placed below the axis and the other above. The upper arm, or that containing the level, can then be closed down—the steel blade fitting into a slit at the outer end of the arm. In this end there is an eccentric, which, at pleasure, can be made to press slightly against the blade, and thus hold it rigid. One side of the blade is marked with lines which show the value of the angle formed by the two arms of the rule, the blade being moved until the under edge of the slit arm is coincident with the mark on the blade showing the required angle then the two inner, or two outer edges of the arms will show the containing lines of the angle. The other side of the blade is marked in inches and twelfths. The inner edge of the arm in which the blade closes is also divided into inches and twelfths, so that when the blade is in a position at right angles with this arm it may form a brace scale.

The inner edges of the arm holding the level is also marked, so that it may show the angle formed by the blade and its own arm. The arms on their sides are divided into inches, eighths, and sixteenths, as in ordinary rules, also into tenths of inches, and also into several scales for the convenience of draughtsmen.

The uses of this convenient little instrument are very numerous—when the blade is closed into its arm and the arms are shut together, it is a spirit level. When the blade is opened at an angle of 90° with its arm, and the other arm shut down so that the slit holds the blade rigid, the blade is perpendicular to the edge containing the level, and the instrument can then be used as a plumb. The combination of a level and moving blade, and arm for obtaining angles, will, to any one in possession of the instrument, suggest various methods of obtaining heights, distances, &c. Besides the above uses, for all measurements requiring only the ordinary foot rule, it will, from the sub-divisions on the sides of the arms, answer the purpose. H. J. T.

Mode of Preserving Fresh Fruits.

Dissolve gutta percha in sulphuret of carbon. The liquid separates into three layers, the upper of which contains mucilaginous matters, and the lower earthy compounds and other impurities; the middle layer is perfectly limpid and contains the pure gutta percha. Separate this from the others by a syphon.

Gather the fruits rather before complete ripeness—dry and brush them; dip them in spirits of wine; then two or three times in the gutta percha liquid; they may then be kept in a box or closet, the temperature of which must not exceed 50° Fahr.

When the fruit is to be eaten, the coating may be peeled off or washed off with a little spirits of wine; and, notwithstanding time and journeys, the fruit will be found to have preserved its taste and perfume, as though it were perfectly fresh.—*Cosmos.*

For the Journal of the Franklin Institute.

Particulars of the Steamer White Cloud.

Hull built by Thomas Collyer. Machinery by Morgan Iron Works. Owners, I. M. Forbes & Co.

HULL.—

Length on deck,	180 feet.
" load line,	179 "
Breadth of beam, (*molded,*)	30 "
Depth of hold,	10 " 7 inches.
" to spar deck,	10 " 7 "
Frames, *molded,*	14 "
" *sided,*	8 "
" apart at centre 26 ins., and strapped with diagonal and double laid braces, $3\frac{1}{2} \times \frac{3}{8}$ ins.	
Draft of water,	5 " 6 "
" at below pressure and revolutions,	24.
Tonnage,	550.
Masts—Two—Schooner rigged.	

ENGINES.—Vertical beam.

Diameter of cylinder,	44 inches.
Length of stroke,	10 feet.
Maximum pressure of steam,	30 lbs.
Cut-off,	variable.

BOILERS—Two—Single return flued.

Length of boilers,	26 feet.
Breadth "	8 " 6 inches.
Height " exclusive of steam chimney,	8 "
Number of furnaces,	4.
Breadth of furnaces,	3 " 6 "
Length of grate bars,	7 "
Number of flues,	{ above 4. below 10.
Internal diameter of flues,	{ above 17 ins. below 10, 12, and 12½ ins.
Length of flues,	{ above 14 ft. 7 ins. below 13 ft. 11 ins.
Heating surface,	2284 square feet.
Diameter of smoke pipe,	5 feet.
Height "	31 "

PADDLE WHEELS.—

Diameter, overboards,	26 "
Length of blades,	7 "
Depth "	3 "
Number "	24.

Remarks.—One independent steam, fire, and bilge pump, constructed for service on Canton River; water-wheel guards for half width extends fore and aft. Date of trial, January, 1859. C. H. H.

For the Journal of the Franklin Institute.

Particulars of the Steamer Karnak.

Hull built by Denney & Brothers. Machinery by Tullock & Denney, Dumbarton, Scotland. Intended service, New York to Havana.

HULL.—

Length on deck from fore part of stem to after part of stern post above spar deck,		210 feet.
Breadth of beam at midship section,	30 "	10 inches.
Depth of hold to spar deck,	25 "	6 "
" main deck,	18 "	6 "
Frames Z L at throats, *molded*,		4½ "
" " *sided*,		⅞ "
" distance apart at centres,		14 "
Keel,		6 "
Length of engine and boiler space,	30 "	
Draft of water at load line,	18 "	
" below pressure and revolutions,	18 "	
Area of immersed midship section at this draft,	495 sq. feet.	
Tonnage,	958.	
Contents of bunkers in tons of coal,	740.	
Masts and rig—Barque.		

ENGINES.—Vertical direct.

Diameter of cylinders,		48 inches.
Length of stroke,	2 feet	3 "
Maximum pressure of steam in pounds,	10.	
Maximum revolutions per minute,	56.	

BOILERS.—Two—Horizontal return tubular.

Length of boilers,	10 feet	6 inches.
Height " exclusive of steam chimney,	15 "	
Number of tubes,	432.	
Internal diameter of tubes,		3 "
Length of tubes,	6 "	9¾ "
Diameter of smoke pipe,	5 "	
Description of coal,	Bituminous.	

PROPELLER.—

Diameter of screw,	12 "	6½ "
Pitch of screw,	19 "	
Number of blades,	3.	

Remarks.—Has wrought iron plate stringers on each deck, and frame ties $2\frac{1}{2} \times \frac{3}{4}$ inch; 12 inches apart in lower hold; also, five water-tight bulkheads. Carries 626 tons of cargo and 4200 gallons of water in bunks.

C. H. H.

Preparation of Calcium.

MM. Lies-Bodart and Jobin announce to the Academy of Sciences at Paris, that they had succeeded in preparing calcium in a purely chemical way, by heating the iodide, with potassium in an iron crucible, closed by a cover screwed on air-tight.

This mode may be at present convenient to chemical professors and students who do not often see this metal, and the fact evolved, that this re-action takes place under high pressure, which it does not under the pressure of the atmosphere, may perhaps lead to results more important on the large scale of industry.

For the Journal of the Franklin Institute.

Particulars of the Steamer Baltimore.

Hull built by John A. Robb. Machinery by Murray & Hazlehurst, Baltimore, Maryland. Intended service, West Indies.

HULL.—

Length on deck from fore part of stem to after part of stern post above the spar deck,	150 feet.	
Breadth of beam at midship section, above the main wales,	20 "	6 inches.
Depth of hold,	8 "	6 "
" to spar deck,	15 "	
Floor timbers at throats, *molded*,	11 "	
" " *sided*,	8 "	
Frames, distance apart at centres,	2 "	3 "
Depth of keel,		6 "
Draft of water at load line,	10 "	6 "
" below pressure and revolutions,	10 "	
Area of immersed midship section at this draft,	170 sq. ft.	
Tonnage, 252.		
Contents of bunkers in tons of coal, 50.		
Masts, 3.—Rig—Foretopsail schooner.		

ENGINE.—Vertical direct.

Diameter of cylinders,		35 inches.
Length of stroke,	2 feet	3 "
Maximum pressure of steam in pounds, 30.		
Maximum revolutions per minute, 75.		

BOILERS.—One—Single return tubular.

Length of boiler,	14 feet.	
Breadth "	9 "	
Height " exclusive of steam chimney,	11 "	8 inches.
Number of furnaces—two.		
Length of grate bars,	5 "	
Number of tubes, 74.		
Internal diameter of tubes,		3¼ "
Length of tubes,	10 "	
Heating surface,	1000 sq. ft.	
Diameter of smoke pipe,	3 feet	10 "
Height " from top of boiler,	34 "	
Description of coal, Anthracite or bituminous.		
Consumption of coal per day, 7 tons.		

PROPELLER.—

Diameter of screw,	9 feet.	
Length of blades,	2 "	
Pitch of screw,	18 "	
Number of blades, 3.		

Remarks.—Has two bulkheads. C. H. H.

Origin of Bituminous Schists.

M. A. Riviere communicated to the Academy of Sciences at Paris, at their Session of 25th October, 1858, a curious observation which had led him to a new theory of the origin of certain rocks of the crust which are found to contain a small quantity of combustible matter.

He was first struck by the resemblance between these rocks and the earth saturated with ordinary coal gas by the leakage of the pipes which convey it. By a series of experiments he found,

1st, That the soil surrounding the pipe, was in certain circumstances, and after some time, more or less impregnated with carbon and bitumen, so as to become sometimes very combustible, and as black as impure coal.

2d, That the nature of the soil had much influence on the absorption; thus, whilst a clayey, slightly damp soil charged with vegetable or animal debris favored this absorption, it was, on the contrary, but slight in dry sand.

3d, That the thickness of the upper strata favored absorption.

4th, That it was greater near the cracks and stratification joints.

5th, That the absorbing materials increase in weight and sometimes in bulk.

6th, That the vegetable matters were gradually converted into carbon more or less bituminous according to circumstances.

7th, That the ferruginous materials were altered, more or less converted into oxides, sulphates or sulphites; and that they would probably have been converted into sulphurets and carbonates, had the gas been less purified, and had the action been sufficiently prolonged and the circumstances favorable.

The immediate means to be taken for the Relief of Workmen Smothered in Wells. By M. P. DORÉ, formerly Preceptor in Chemistry at the Polytechnique School, Paris.*

In consideration of the numerous accidents of this nature which happen daily, we cannot too forcibly call attention to the simplest means of preventing fatal consequences.

1. When a workman has fallen fainting at the bottom of a well, while some one is sent for the nearest physician, the person who is to descend into the well in order to bring up the suffocated man, should prepare, by tying over his mouth a bag of muslin filled with dry lime and Glauber salts (sulphate of soda,) quickly powdered and intimately mixed. This precaution is destined to prevent the vitiated air of the well from making another victim. (S. Girardin de Rouen, *Leçons de Chimie*, p. 39.)

2. That done, it is necessary to let down at the same time and in advance of the rescuer a lighted candle, to determine at what depth the layer of vitiated air commences—and the second man should not be left at the bottom of the well longer than the time strictly necessary to permit him to attach to the fainting man a second rope, which has been let down in the meantime.

The man having been brought to the surface, if the physician has not arrived, the following directions should be observed:

* From "Les Nouvelles Annales de la Construction."

3. Expose the patient in the open air, naked, without fear of the cold or the rain, placing him on his back, the head and the chest elevated.

4. Throw with much force over the surface of the body, and particularly over the face and chest, tepid water, or even cold water if in summer, continuing to do so until respiration commences.

5. In the meantime rub the body, and especially the chest, with cloths dipped in vinegar and water, cologne water, or even brandy. Every four or five minutes dry the body with warm cloths, and then continue the friction and the dashing with water.

6. Rub with a brush the soles of the feet, the palms of the hands, and the spine.

7. Cause him to smell hartshorn at intervals, without allowing the bottle to remain for too long a time under his nose.

8. Finally, if the suffocation has taken place in a foul well in consequence of sulphuretted hydrogen, it will be useful to pass under his nose a vessel containing chloride of lime and vinegar, or a solution of chloride of potassa.

Such should be the treatment of the patient while waiting for the arrival of a physician.

In order to assure those who find it necessary to give assistance in such cases that they cannot employ too fully the dashings of cold or tepid water, we cite the following case, observed in the winter of 1802, of a nurse in the "Hospital Murat" at Narbonne, by Doctor Darbon, then physician to that hospital.

It was noticed one morning at the time of inspection, that one of the nurses was absent. On going to his chamber they found him suffocated by the fumes of charcoal. Every remedy was applied, and still at two o'clock in the afternoon the patient had given no signs of life. Then Dr. Darbon commenced dashing tepid water over him with violence, using a sauce-pan with a long handle, which gave great force to the dashes of water.

At the end of *four hours* of this treatment, the patient revived, was placed in a warm bed and carefully attended to, and in four days resumed his duties.

We may add that M. Bourgeois mentions a case where the patient only revived after *twelve hours* of this treatment. F. R.

New Copying Telegraph of M. Bonelli.

Many months ago the editor of the *Cosmos*, a Parisian weekly journal of great excellence, announced, with no little pomp, the invention of this apparatus by M. Bonelli, and pronouncing it entirely different and very superior to any thing hitherto known, promised a precise description in the next number. After awhile another article began the fulfilment of this promise by a history and criticism of known instruments, in which there was nothing new but the unfairness towards the

inventors. This article was to be continued in the next number, when we were to have at last the description of the new wonder, but from that time until the number of 17th September, no word has been seen about it. And now we have, not a continuation of the former grand flourish, but a new article beginning "still another telegraphic marvel." Then follows at last a description of the Bonelli invention, which, it appears is the same as that invented by Bakewell, in England, and long known here; in which the electric current passing through an iron wire decomposes yellow prussiate of potassa, and deposits Prussian blue, thus writing in yellow letters upon a blue ground, (Abbè Moigno says green,) when the original despatch is written upon metal or paper soaked in a metallic salt with a varnish ink. The only difference is, that whereas the old conductor was a single wire, Bonelli's is a rope of from fifty to sixty insulated wires, which are spread into brushes at their end, and the different parts of the despatch are thus copied at the same time, and the article is done in one-fiftieth or sixtieth of the time. This is ingenious and important; the only question is, whether the improvement will pay for the increased expense. The Abbè estimates the expense of the new conductor at from 1000 to 1200 francs per kilometre; that is, from $320 to $390 per mile. If it can be put up for this, it will probably be an improvement on our present systems.

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*Steatite Gas-Burners.**

M. Schwartz, of Nuremberg, has succeeded in manufacturing gas-burners of steatite or soapstone; the following description of which is given by *Le Génie Industriel*:—

"The materials hitherto used in making gas-burners, such as iron, brass, &c., possess the inconvenience of oxidizing during the combustion of the gas, and in a short time the holes or the slits become enlarged, the burners consume a larger quantity of gas, and the flame is less brilliant. Burners made of porcelain, which substance has been proposed as a substitute for metals, have not answered so well as was expected, because that material becomes rapidly porous by heat. These inconveniences suggested to M. Schwartz the idea of making burners of the steatite or soapstone that is found at Gopfergrün, in the district of Wensiedel, in Bavaria; which, according to the analysis of Professor Kaiser, consists of 30 parts of magnesia, 60 of silica, 5 of water, and 3 of the oxide of iron.

"This substance is cut into rectangular pieces, which are put into a muffle that is hermetically closed. It is then exposed to heat for four or five hours; the heat being at first slack, but afterwards raised till the muffle is red hot. This operation requires great care, because the stone easily splinters; and it is on that account that a moderate heat is at first used to expel the water. The higher temperature is not employed until that is effectually done, after which the violent heat is kept up for two hours. All impure pieces of steatite must be carefully

* From the Journal of Gas Lighting, &c., Aug., 1858.

thrown aside; those, for instance, which have ferruginous streaks, or argillaceous specks.

"After this preparatory process, the calcined stone is put on a lathe to reduce it into form, and as the steatite does not completely lose its property of absorbing moisture from the air by the first calcination, the burner is then immersed in pure oil, in which it is boiled till it becomes of a dark brown color. It is then dried, and is polished with a lock of wool. In cutting and piercing the burner, advantage is taken of the natural cleavage of the stone, of which the workman soon learns how to avail himself.

"The principal constituent elements of steatite, the silica and magnesia, resist the heat to which they are subjected without change, and consequently remain unaltered by the highest temperature to which they are exposed in the burning of gas. The process of calcination, by depriving the stone entirely of the water it contained, seems to render it more compact. Steatite also possesses the property of contracting by heat, and after four or five days use the holes or slits of the burners are not increased in size. This fact has been proved in burners that have been kept constantly in action for eight weeks, at the end of which time a kind of varnish or glaze, of a flinty character, was collected on the edges of the slits.

"Professor Liebig recommends the steatite burners for use in chemical laboratories. That eminent chemist is of opinion that these burners possess the advantage over metal ones, that the height of the flame can be regulated most exactly without any flickering, and, the flame being steadier, it can be more enlarged."

Accidental Production of Colors in Photographs. By M. MUGUET.

"I will state the circumstances under which I obtained natural colors, in taking, the other day, a stereoscopic picture of some ruins covered with ivy. Each glass plate had been exposed twenty seconds, the sun shining brilliantly, and on developing I was astonished at finding the color strongly developed: the ivy was represented by a deep green tint, some old timber of trees by a brown, the stones by a gray; all with colors in the highest degree varied. Fixing did not alter them, but in drying, they lost their brilliancy, with the exception of the green, which has remained as decided as at first. In taking a second picture the same effect was produced, but with less strength.

The collodion was, perhaps, two months old, nearly colorless, and gave a thin coat. It was prepared by Mr. Robinson, chemist, who assured me that he had iodized it with iodide of potassium with a little bromine.

The bath was a neutral solution of crystallized nitrate of silver. I had developed with a solution formed of two grains of pyro-gallic acid, 20 drops of acetic acid dissolved in one ounce of water, and fixed by a concentrated solution of cyanide of potassium."

M. Raymond remarks that if, as soon as a collodion picture begins

to develop clearly under the combined action of pyro-gallic and acetic acid, it be exposed to the light without previous drying, it is rapidly changed into a positive picture, and takes more or less perfectly the colors of the model. The stronger the light is, and the less the development of the picture, the more rapid but at the same time the less perfect is the transformation. A picture accidentally made in this way was completed in a quarter of an hour, and lasted some months with scarcely any loss of brilliancy, and even now, after more than two years standing on a shelf in the laboratory, it is not completely effaced.

In reference to this communication, M. Bertsch reminded the hearers, that every photographer had frequently observed that when the development of a direct positive was arrested at a certain point, and the picture placed on a black ground, effects were obtained which imitated the natural color very well. The whole picture takes on a rose-color, which imitates tolerably well the tones of the face; and as the hair and dress, which are darker than the face, are but slightly brought out, they allow the black color of the ground to appear through them, and thus produce the appearence of a coloring which does not in reality exist.—*Cosmos.*

A Lunar Tide upon Lake Michigan.

The annual meeting of the Chicago Historical Society was held last evening at the house of Hon. I. N. Arnold, on Erie Street.

Among other important facts communicated, Colonel Graham stated, as the result of a long and carefully conducted series of observations, his discovery of a lunar tidal wave upon Lake Michigan. From the comparatively small area of the body of water acted upon by the lunar influence, the co-ordinate of altitude could not be but small. This circumstance, added to that of the almost constant disturbance of the lake surface by winds, renders this co-ordinate of altitude measurable only in calm weather, and when the moon is in conjunction with or in opposition to the sun. At such times its average is about two-tenths of a foot, or say 2½ inches.

This announcement will be a matter of much interest to the scientific world generally.—*Chicago Daily Journal, Dec.* 1, 1858.

Preparation of a Detonating Compound of Silver by means of Coal-Gas.

By MM. Vogel and Reischauer.

If a current of ordinary coal-gas be passed through a neutral solution of nitrate of silver, the liquor soon becomes troubled and a crystalline precipitate is deposited. Under the microscope this precipitate is seen to be composed of a mass of small prisms, but its dominant property is that, after drying, it explodes as violently as fulminating

silver by heat or by the hammer. It however is distinguished from the fulminate of silver by the form of its crystals, its behavior with boiling water, its decomposition by potassa, and the quantity of silver which it contains; but especially by the fact that it is entirely decomposed by chlorhydric acid with evolution of a gas, which is combustible, and has the penetrating and peculiar odor of coal-gas. By means of this reaction the author determined the content of silver, and found from 78·3 to 84 per cent.

If the solution of nitrate be acid, the amount of precipitate is much diminished. If the acetate be used, a gray compound is formed which detonates, but less violently than that from the nitrate. By continuing to pass the gas through an acid solution of acetate of silver for several days, the silver was so completely precipitated, that the liquid gave no precipitate with chlorhydric acid.

If the gas from the decomposition of the precipitate from nitrate of silver by chlorhydric acid, be passed through another solution of the nitrate, it forms a brilliant white precipitate of microscopic crystalline needles. This precipitate also detonates with great violence.

As this compound burns with great difficulty by oxide of copper, the authors did not succeed in analyzing it; but hope to do so by the examination of the gas evolved by chlorhydric acid.

They remark also that the formation of this body seems to depend on the nature of the gas; so that sometimes the first bubbles of gas produce considerable turbidity, while at other times, it is only after some hours, that the action is manifested.—*Academy of Sciences of Munich, 16th January*, 1858.

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*Process for Obtaining Aluminium.** Patented by LUIGI FERRARI CORBELLI. January 26, 1858, in London.

By the improved process the metal is obtained direct from argillaceous earth or clay, which after being well washed and cleansed from extraneous matters, such as stones, sticks, leaves, and such like substances, is submitted to the following process:—Take one hundred grammes of the well-washed clay, and after well drying it, dissolve it in about six times its weight of concentrated sulphuric acid or very strong hydrochloric acid. Dry the clay again, and heat it in an earthen vessel up to four hundred and fifty or five hundred degrees of the centigrade thermometer, after which mix with it two hundred grammes of yellow prussiate of potash, which should be quite dry and pulverized. The quantity of this material that should be added to the clay, will depend in some measure upon the quantity of siliceous matter contained in the clay. To this mixture add one hundred and fifty grammes of common salt, and place all the ingredients when intimately mixed together in a crucible. Heat them up to a white heat, and after the mass is cool, the aluminum will be found at the botton of the crucible.

* From the London Repertory of Patent Inventions, No. 778.

A New and Economical Furnace.

The principle of M. Beaufumè's furnace is, the production of inflammable gases by the distillation of the combustible, in a separate apparatus, and the conduction of these gases to be burned in the furnace in place of the fuel itself. The apparatus is said to have been already employed for plaster and porcelain furnaces, and to have produced an economy of 30 and in some cases of 60 ℘ cent.; and in other experiments to have evaporated 10·544 k. (23¼ lbs.) of water under a mean pressure of 4 atmospheres, with a consumption of 1·5 k. (3⅜ lbs.) of coal per hour; whilst with the same charge of fuel, the ordinary furnaces vaporize on an average not more than 6 k. (13¼ lbs.) The furnaces are also much less liable to be burned than with ordinary fuel.

Cosmos.

Improvements in the Treatment or Preparation of Moulds for Casting Metals. Patented by ANDREW and THOMAS WALKER. January 19, 1858, in London.*

Our said invention relates to the treatment or preparation of the surfaces of sand moulds for casting metals by means of anthracite, "blind," or "stone" coal dust. The coal or mineral preferred for this purpose is anthracite, but any coal of an anti-bituminous kind will answer for carrying out the improvements. The coal or anthracite mineral is used in its natural condition, as dug from the earth, being merely reduced by mechanical means to the proper condition of powder or dust. The powder or dust is placed in permeable bags, and dusted upon the mould surfaces with which the metal will come in contact when the casting operation takes place. The same material may also be used as a wash for moulds; it may also be employed mixed with sand, as in the case of common coal-dust. This system of preparing mould surfaces secures economy in the materials used, whilst it also enables the founder to produce extremely sharp and fine castings.

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*Improvements in Submarine Conductors of Electric Telegraphs.** Patented by JOHN CORNISH HARCOURT SIEVIER. February 13, 1858.

My invention consists in coating copper wire to be employed as a submarine conductor of electricity with bismuth, tin, iron, lead, brass, antimony, zinc, nickel (by preference containing arsenic), or German silver, or with any combination or alloy of two or more of these metals, prior to the treatment of such copper wire with any means of insulating, either by gutta percha, shellac, tar, bituminous or resinous substances, fibrous materials, or other substances, and likewise prior to the application of the wire cable. Copper being a powerful conductor of electricity, my object is to coat copper wire with a metal or alloy or combination of metals having a much less degree of conductibility than

* From the London Repertory of Patent Inventions, No. 778.

copper, in order that the copper may become more easily insulated than it would otherwise be if surrounded or encased as usually with gutta percha or other insulating materials, without being first coated with a metal or alloy or combination of metals having comparatively slight degree of conductibility.

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*Lecture on Rotary Stability and its Applications to Astronomical Observations on board Ships.** By the Rev. Prof. BADEN POWELL.

The object of the discourse was to explain an apparatus recently contrived, for the purpose of giving perfect stability for the nicest astronomical observations on board a ship pitching and tossing with every wave and gust of wind. This contrivance has been the result of a principle of rotary motion, which, although long since understood and acknowledged in theory, has been but lately considered with regard to its practical results, and when first tangibly exhibited in the gyroscope or free balanced revolver, had excited unbounded surprise. It was forgotten how perfectly similar, and equally paradoxical in its nature, is the common and familiar result of a top sustained by the mere act of spinning in a position from which it directly falls when the rotation ceases. On a former occasion, on the 3d of March, 1854, the Professor brought under the notice of the members the principle of "composition of rotations," and those applications of it which had been formed in certain rotary phenomena of projectiles, illustrated by the gyroscope in its several earlier forms, as successively modified by Bonenberger, Atkinson, Fessel, and Wheatstone, showing the identity of those results on a small scale, with the grand cosmical phenomenon of the precession of the equinoxes. Since that time the same principle had been applied by M. Foucault to prove the earth's rotation on its axis, and which the lecturer said had been pointed out eighteen years before, by Mr. Sang, of Edinburgh, and only not practically accomplished from the expense of the necessary apparatus. The rotary apparatus, which the lecturer proceeded to explain, for giving an invariable plane or platform for astronomical instruments used at sea, was invented by Prof. C. P. Smyth. Two simple first principles in dynamics give the clue to the whole of the applications. 1. The tendency of a body in rotation to retain that rotation in the same place, when perfectly balanced, irrespective of the motion of external objects, which is termed "the fixity of the plane of rotation." 2. "The composition of rotary motion," or that when a force is impressed on a body in rotation, it does not show itself directly, but is compounded with the fixed motion, so that the rotation takes an intermediate direction, or the axis shifts its position in space. This being the cause of the motion of the earth's axis, giving rise to the precession of equinoxes, it is generally called a "precessional motion."

One of the most important desiderata of nautical astronomy has always been the means of observing at sea the eclipses of Jupiter's satellites—so frequently recurring, and affording so simple and direct

* From the London Practical Mechanics' Journal, October, 1858.

a means of obtaining the longitude. Stability on board ship is essential to this, and many schemes have been invented for the purpose of supporting the telescope, and the observer with it, so as to be free from the motion of the ship. In general, to procure this stability, it seemed an obvious resource to suspend any object which it was desired to keep steady by cords from a fixed point in the vessel. But a body thus suspended is like a plumb line; when the point of support is itself set in motion, it acquires a part of that motion, and becomes a pendulum, and it oscillates more irregularly and violently, from the accumulations of motions impressed upon it continually by every fresh motion of the ship. Nairne's or Trwin's "marine chair" for carrying the observer and the telescope was simply an application of this principle. It was found not to answer, as the principle upon which it was constructed tended to perpetuate disturbances rather than destroy them. In these cases the centre of gravity is *below*. If it were suspended in gimbals, so that the centre of gravity should be at the point of suspension, the tendency to oscillate from this cause would be overcome. But still any slight cause might disturb the level; there would be no principle of permanent stability. Thus, to produce this desirable stability for a place or stand on which the telescope is to be rested, we must have recourse to the free revolving disk accurately balanced within gimbals, on its centre of gravity. The balancing must be perfected by means of the adjustable plugs before-mentioned, both in the disk, and in the gimbal frames; the pivots of the gimbals must be of perfect workmanship, to turn with the least possible friction, yet without looseness or displacement. An immense rotary velocity must be communicated to the disk by machinery, of which its suspension must be quite independent, so that the moving power can be instantaneously withdrawn. The Professor stated, that all these conditions are fulfilled in the form of the machine, which, after repeated trials, has been adopted by Prof. Smyth, exhibited by him at the Paris Exhibition, 1855, and successfully tried on board Mr. Stephenson's yacht, "*Titania*," on his voyage to Teneriffe, in 1856. A free revolving disk in gimbals, externally turning on pivots horizontally resting on supports fixed to the deck, will suffice to preserve the telescope from all deviation due to pitching and rolling. The addition of another disk, freely revolving in a vertical plane, whose external pivots turn vertically in a frame attached to the top of the former internal frame, the upper pivot projecting through it, and carrying a small platform for the telescope, and the whole, of course, balanced below, will preserve the telescope from any lateral deviations of the ship. And the combination of the two will give a plane retaining its parallelism against all those causes of disturbance. But under favorable circumstances this last cause of disturbance is but small, so that this addition may often be of little importance. Thus we have the whole construction of what the inventor designates as "the compound precessional free revolver stand."

The Professor concluded by taking a summary view of the whole subject. By direct consequence from the simplest acknowledged mechanical principles, the gyroscope, when its equilibrium is slightly disturbed,

demonstrates the precession of equinoxes, explains the boomerang, and sustains itself in the air against gravitation. When its equilibrium is undisturbed, it exhibits to the eye the actual rotation of the earth; and when restricted to one plane, it acts as a magnetic needle without magnetism, or spontaneously rotates in parallelism with the earth. To these remarkable, diversified, and somewhat paradoxical applications, there is now added another of far higher utility—that it gives perfect stability for the nicest astronomical observations on board a ship pitching and tossing with every wave and gust of wind.

Before the Royal Institution.

For the Journal of the Franklin Institute.

Chemical Examination of the Commercial Varieties of "Common Salt," or Chloride of Sodium. By CAMPBELL MORFIT.

Referring to the composition of the natural sources of the commercial varieties of chloride of sodium, such as salines, bay and sea waters, it is very reasonable to suppose that the derivative substance should comprise all or many of the constituents of the original material. These constituents are chlorine, bromine, iodine, fluorine; sulphuric, nitric, phosphoric, boracic, and silicic acids; sodium, potassium, magnesium, calcium, aluminum, iron, oxygen, and insoluble matter. Though only a portion of those that may be present are in appreciable amount, the examination was very exact, and with a view to detect any or all of them, however minute might be the trace. As lead and copper vessels are sometimes used in the manufacture of salt, there was also a search for any traces of those metals that might have been thence derived. The proportion of accidental water was likewise determined.

Fluorine.—This element was not found in any of the specimens, notwithstanding the great care with which it was sought. One hundred grammes of salt were dissolved in pure water and treated with a solution of chloride of calcium. The precipitate was collected on a filter, and after being thoroughly washed, rinsed off into a leaden cup and heated upon the sand bath, first to expel water, and then with sulphuric acid under a glass cover for some hours, but without obtaining the least corrosion of the glass. The salt was not treated directly, because the large quantity necessary to give an accurate result causes a copious elimination of chlorine, which would interfere with the reaction, and be otherwise inconvenient and disagreeable. Doubtful, too, whether the fluorine existed wholly or only partially in soluble combination, I preferred treating together both the insoluble residue of the salt and the precipitate formed from it, by chloride of calcium which carries down any fluorine that may be present.

Iodine.—Previous experimenters have reported the presence of this element in some salts, but I could not detect it, though I applied the most delicate tests, and operated on the large quantity of 100 grams. It remains, doubtless, with the bromine in the mother water.

My first essays were with chloride of palladium, which was added to a clear and dense solution of 100 grammes of salt: but even after a

night's repose under paper cover to keep out dust, not the least precipitate or cloudiness ensued, as should have followed from the presence of even as small a quantity as 0·0001.

To make assurance doubly sure, this essay was checked by Moride's test, which consisted in adding two drops of fuming nitric acid to a portion of the above made solution of salt, shaking well, and pouring in one drachm of benzole previous to a second shaking. Benzole being an eminent solvent of free iodine, rises to the surface, and assumes a bright red color in ten or fifteen minutes, if that element is present. More than the above quantity of acid should not be used, else chlorine will also be liberated and mask the color; nor must the test be heated or exposed too long to air, for the iodine will volatilize and leave the benzole colorless. This test is delicate to 0·0002 of iodine, as was verified by actual experiment.

This mode not only serves for a qualitative test, but for the quantitative estimation of the iodine, as the benzole will contain all that may be present, and need only to be removed with the pipette, washed with water, and treated with nitrate of silver. The iodide of silver must then be filtered off and washed with alcohol of 0·86. The bromine and chlorine, not being soluble in the benzole, remain in the liquid and wash-water, and may be separated therefrom by the usual process.

Bromine.—This element is almost universally associated with iodine, so that where one is found the presence of the other may be suspected, and vice versa. I did not succeed in detecting even traces. My experiments were with Reynoso's effective test, which is based upon the fact that oxygenated water decomposes hydriodic or hydrobromic acid, but has no action upon the liberated iodine or bromine. A piece of deutoxide of barium having been placed in a test tube is to be drenched with ether, and a few drops of pure hyhrochloric acid and starch solution added; in a few moments the hydrochloric acid acts upon the peroxide of barium, oxygenated water is formed, and bubbles are evolved. At this time a portion of the clear and dense solution of 100 grammes of salt is added and mixed thoroughly by shaking. If bromine is present it is taken up by the ether, which rises to the surface colored yellow, while the iodine, its associate, remains as the lower stratum with the starch, and tints it blue.

Nitric Acid.—If the salt contains any nitrate it must be in very minute proportion, and happily there is a test for detecting traces. It is known as Higgins', and is founded upon the elimination of iodine from hydriodic acid by nitric acid, and its subsequent action upon starch. It is accurate to 0·0005.

The hydriodic acid is formed by the action of sulphuric acid on iodide of potassium. The test was prepared by dissolving an half gramme of iodide of potassium in distilled water; and in order that the liquor may not be strong enough to eliminate the iodine from the action of sulphuric acid alone, it must be diluted until its volume amounts to five fluid ounces. A portion of the clear and dense solution of 100 grammes of salt was then mixed with about one-tenth of its volume of

sulphuric acid heated on the sand bath *nearly* to boiling, for five minutes, then *perfectly* cooled in water to about 50° F., and heated with a drop or two of starch solution, and a few drops of the test liquid. The heat must be less than boiling, so that chlorine may not be generated to produce a blue color; but care must be observed to continue it for some minutes in order to insure the elimination of all the nitric acid; and the sulphuric acid solution should not be stronger than above directed, else it will produce iodine reaction in the most dilute solution of iodide of potassium, even without the presence of nitric acid. The sulphuric acid on the sides of the tube should also be washed down previous to the addition of the iodide of potassium.

A bluish tinge indicates the presence of nitrate, provided it becomes evident within twelve minutes, for a longer exposure to the air decomposes the hydriodic acid eliminated from the iodide of potassium, and sets free the iodine to color the starch. If the tint is not apparent in twelve minutes, the inference is no nitrate, for this test detects 0·0005, or less.

Boracic Acid.—This acid, though cautiously looked for, was not to be found. I followed the plan of strongly acidulating a very dense solution of the salt with hydrochloric acid, and then testing it with turmeric paper. After the paper had been immersed some thirty minutes, it was taken out and dried at 212° F. When borate is present, the paper on drying will assume a deep red or brown color; and as boracic is the only acid that thus colors turmeric paper like the fixed alkalies, this behavior is very reliable and exact, even to less than a thousandth.

Potassa.—As potassa salts are supposed to have a material influence upon the quality of commercial chloride of sodium, even when they are in minute proportion, care was observed to examine for the slightest traces. I, therefore, took the comparatively large quantity of 100 grammes, triturated it completely in a mortar with relays of common alcohol, and filtered the united liquors. Alcohol of that strength leaves the sulphate of lime and the most of the chloride of sodium with the insoluble residue. The clear filtrate was then treated in the usual manner, with alcoholic solution of chloride of platinum.

I prefer the above mode of dissolving out the potassa salt, for the reason that if an aqueous solution of the whole of the salt is first made, the alcohol added to insure the precipitation of the potassa—platinum chloride, simultaneously throws down much of the chloride of sodium, and the water used for washing it out takes with it also traces of the double chloride. More than traces we never found in any sample, but where the quantity is appreciable it must then be collected on a counterpoised filter, washed with dilute alcohol, dried in vacuo with the counterpoise, and weighed against it.

Copper and Lead.—A fluid once of freshly made and strongly impregnated sulphuretted hydrogen water was added to a portion of dense solution of the salt, and the whole left to repose some hours; but as no black precipitate ensued, the inference was that they contained no lead.

As both metals are precipitated black by sulphuretted hydrogen, it becomes necessary to dissolve the precipitated sulphuret in hydrochloric acid, filter, throw down the lead by sulphuric acid as sulphate, and then test the filtrate for copper.

Water.—The preceding constituents are rarely met with in larger quantities than traces, and this formula as to them has been rather more in reference to a qualitative examination; but water and all others that are henceforth noted exist mostly in weighable proportion, and consequently the process will now be both qualitative and quantitative, revealing in its progress any one if present, and estimating each as it is isolated.

Chloride of sodium does not contain any constitutional water or water of crystallization, but as found in commerce, is always more or less damp according to the care observed in the manufacture and drying of it. When the amount of moisture is large, it seriously depreciates the money value of the salt, and it becomes necessary therefore to estimate it very accurately. To this end one gramme of the finely powdered salt was gently heated in a platinum crucible with the cover on until decrepitation ceased, so as to prevent loss by ejection of particles. The cover being then removed, the heat was continued below dull redness for ten minutes, and the crucible and contents finally weighed. After having noted the weight, the crucible and contents were again heated at a little higher temperature than before, so as to be assured that every trace of water had been expelled, as is known when the second weight shows no loss on the first. By careful management and skilful regulation of the heat, the whole of the water is driven off even from the more retentive magnesian and lime chlorides, if they are present, without the volatilization or decomposition of the least portion of chloride. It is advisable, however, always to check the first result by a repetition of the essay with a new one-gramme portion of the salt.

Sulphuric Acid.—Chlorine and sulphuric acid were estimated exclusively from a new portion of one gramme. For this purpose it was digested in distilled water, filtered to separate insoluble matter, treated with slight excess of nitrate of baryta, left to repose for twelve hours for the entire subsidence of the precipitate, so as to facilitate a clear filtration, filtered and washed thoroughly with hot water. The filtrate was set aside as A. The filter suspected to contain phosphate and carbonate of baryta with the sulphate, was treated first with nitric acid and then washed with hot water to dissolve them out, and the washings set aside as B. The filter, C, was then dried, ignited, and weighed as sulphate of baryta, and the amount of sulphuric acid deduced from it by calculation.

Phosphoric and Carbonic Acids.—The filtrate, B, was then tested for phosphate with aqua ammonia perfectly free from carbonate, but as neither it nor sulphuric acid gave any cloudiness, the absence of baryta compound was evident.

Chlorine.—This element was estimated in the filtrate, A, by treating it with a solution of nitrate of silver in the usual manner.

If the preliminary essays have shown the presence of iodine or bromine, the proportion of these elements, respectively determined, as before directed, must be deducted from the chloride of silver, which, as before estimated, is always mixed with them.

Insoluble Matter.—The filtrate from the chlorine and sulphuric acid essays being mixed with excess of baryta and silver salts, which require tedious manipulation for their removal, it is useless for the estimation of the other constituents, many of which, moreover, are in such limited quantity as to require the large portion of ten grammes to give accurate results. This quantity of salt was therefore carefully weighed out and digested as before, to complete solution in distilled water, filtered and washed with hot water. The filter was D, and the filtrate, E. The former after being dried was ignited and weighed as insoluble matter, which consists mostly of silicates. The latter, or filtrate E, was covered with paper to prevent entrance of dust, evaporated to a very small volume, then acidulated with hydrochloric acid (which will produce effervescence if carbonates are present), and the evaporation continued to dryness, with caution against the admission of dusty particles from the air. After having cooled, it was re-digested with distilled water, filtered and washed with hot water. The filtrate, G, was set aside, and the filter, H, ignited and weighed as soluble silica.

Soluble Organic Matter.—If any soluble organic compound should exist in the salt, its acids, provided they are insoluble in their free state, will be eliminated at this stage of the process, and accompany the silica as dark flocculæ, which burn off during the ignition of the filter, and therefore leave the calx white. The proportion of them is rarely appreciable.

Lime.—The filtrate, G, was first treated with a little muriate of ammonia, and then supersaturated with carbonate of ammonia to precipitate the alumina and iron with the lime, while the magnesia would be kept in solution by the ammoniacal salt added and formed during the reaction. As carbonate of ammonia, when in excess, will retain a portion of the iron dissolved, and as it is very difficult also to produce an entire separation of the lime from the liquid owing to the probable formation of a little bi-carbonate from the decomposition of ammonia carbonate, this contingency must be provided against by evaporating the liquid to dryness, and then largely drenching with very dilute solution of oxalic acid instead of with pure water. Any excess of carbonate of ammonia is thus neutralized, and all the iron previously retained by it, as well as the lime, will fall. The whole was then filtered and washed, and after being tested with a drop of oxalate of ammonia and also of sulphide of ammonium, to be assured that all lime and iron had been separated, the filtrate was placed aside as K.

The filter, M, containing all the lime, partly as carbonate and partly oxalate, together with the iron and alumina, was displaced by pure hydrochloric acid. The filtrate was acidulated with a few drops of chemically pure sulphuric acid, and mixed with four volumes of 93 per cent. alcohol, filtered and washed with dilute alcohol rather than with distilled water, which will dissolve more or less of the sulphate. This sulphate after

being dried was ignited and weighed, and the lime thence calculated. It is necessary always to test the filtrates to be assured of the entire separation of the lime.

A shorter method of estimating the lime would be to precipitate it direct from the salt solution by sulphuric acid and strong alcohol, but chloride of sodium being more or less insoluble in the latter liquid, it goes down with the lime, and the large amount of water required to wash it takes up simultaneously some of the sulphate of lime, and thus leads to error.

The usual process of separating the lime from magnesia, alumina, and iron by oxalate of ammonia, would be too tedious and not very accurate; for as the solution is in the first instance acid, the necessary pre-addition of aqua ammoniæ to neutralize it so as to perfect the insolubility of the precipitated lime—oxalate would endanger the simultaneous deposition of a portion of the iron and alumina, which existing as they do in the salts in such minute quantities must be very cautiously and exactly estimated. Moreover, if any of the lime or magnesia exists as phosphate, the direct use of aqua ammoniæ will throw them down as such, notwithstanding the presence of ammoniacal salts. My reasons for estimating the lime as sulphate is because that combination is constant and not liable like the carbonate to change during ignition.

Iron.—The filtrate from the sulphate of lime containing the iron and the alumina with the excess of alcohol, was evaporated to dryness in a platinum capsule, ignited at low heat to drive off organic matter introduced by the alcohol, and which would otherwise interfere with the subsequent precipitation of the iron, dissolved in water, acidulated with hydrochloric acid, boiled in a silver capsule with pure caustic potassa ley, filtered and *thoroughly* washed with *hot* water. It was then dried, ignited, and weighed as peroxide of iron.

Alumina.—The alumina remaining in the filtrate was separated by neutralizing the excess of potassa in the latter with hydrochloric acid, adding a slight excess of carbonate ammonia, and warming for some hours on the sand bath. When the precipitated alumina had separated in flocculæ, it was filtered off, well washed with *hot* water, dried, ignited, and weighed.

Magnesia.—The filtrate, K, which in the interval had been evaporated upon the sand bath to one-fourth of its original volume, was first treated with ammonia and then with phosphate of soda. The vessel having been covered with paper, was left on the sand bath for some hours. It is always necessary to warm and to allow at least twelve hours repose, for when the magnesia is in minute quantity it will require that length of time for its separation, as it often happens even when liquids contain phosphate, they do not give immediate signs of its presence upon the addition of the re-agents. The ammonia phosphate was then filtered off, washed with dilute ammoniated water, dried, ignited, and weighed. The amount of magnesia was deduced by calculation.

No. 19 E. Twelfth St., New York, 1858.

Chemical Composition of the Commercial Varieties of

Rank.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Commercial Brand; and Source of the Specimen.	Key West Solar, Florida.	St. Martins.	Liverpool Rock.	Kiskiminitas, from Tarentum, Pa.	Oso.
Chloride of sodium,	0·993514	0·985266	0 982713	0·977931	0 975485
Water,	0·008000	0·007000	0·005000	0·019000	0·020000
Insoluble residue,	0·000050	0·002000	0·006000	0·000200	0·000300
Chloride of potassium,	—	—	—	—	—
Chloride of calcium,	0·000119	—	—	0·003017	—
Chloride of magnesium,	0·000934	0·002123	0 002547	0·000849	0 002123
Sulphate of lime,	0·000554	0·000510	0·001700	—	0·001900
Sulphate of potassa,	—	—	S. trace.	—	—
Sulphate of soda,	—	0·002520	0·000659	—	0 001364
Nitrate of soda,	trace.	—	S. trace.	trace.	—
Silicate of soda,	trace.	0·000336	0·000505	0 000252	0 000505
Organic matter, (soluble,)	—	—	—	—	trace.
Iron, ($Fe^2 O^3$,)	0·000800	0·000400	0·001100	0·000200	trace.
Alumina, ($Al^2 O^3$,)		0·000200		0·000500	0·002000
Total,	1·003971	1·000355	1·000224	1·001949	1·003677

Table

Rank.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.
Commercial Brand; and Source of the Specimen.	Spencer's boiled, from Syracuse, N. York.	Hope Factory, N. York.	Nassau.	Anguila.	Syracuse Company, N. York.	Tarentum, Pa.
Chloride of sodium,	0·962938	0·962851	0·960321	0·957348	0 956663	0·943494
Water,	0·022000	0·014000	0·011000	0·022000	0 016000	0·040000
Insoluble residue,	0·000300	0·000600	0·001000	0·005800	0·001800	0·000300
Chloride of potassium,	trace.	—	—	—	—	—
Chloride of calcium,	0·000009	—	—	—	—	0·007541
Chloride of magnesium,	0·002717	0·002123	0.008665	0·002293	0·000509	0·008491
Sulphate of lime,	0·013992	0·016500	0·004800	0 008600	0·020000	0·002740
Sulphate of potassa,	—	trace.	traces.	—	—	—
Sulphate of soda,	trace.	0 000667	0·009562	0·004410	0·002978	—
Nitrate of soda,	—	—	trace.	trace.	—	trace.
Silicate of soda,	0 000168	0·000168	0·000673	0·000168	0·000168	0 000336
Organ. mat'r,(soluble,)	trace.	—	—	—	—	—
Iron ($Fe^2 O^3$,)	0·800800	0·000600	0·000500	0·000200	0 000700	0·000200
Alumina, ($Al^2 O^3$,)	0·001700	0·002000	0·000500	0·001200	0·001300	0·000600
Total,	1·004624	0·999509	0·997021	1·002019	1·000118	1·003702

"Common Salt" or Chloride of Sodium. By CAMPBELL MORFIT. *One gramme.*

No. 6.	No. 7.	No. 8.	No. 9.	No 10.	No. 11.	No. 12.	No. 13.
Liverpool fine.	Liverpool ground alum.	Cudwell's boiled, from Syracuse, N. York.	N. York.	Kanawha Virginia.	Haskin's salina, coarse, from Syracuse, N. York.	Goose Creek, Kentucky.	Bonaire.
·969917	0·969423	0·968882	0·968488	0·967460	0·965540	0·964276	0·963288
·005000	0 011000	0·012000	0 012000	0·022000	0·014000	0·022000	0·017000
·000400	0·000700	0·000400	0·001100	0·000500	0·000600	0·000300	0·001000
—	—	—	—	S. trace.	—	S. trace.	—
—	—	—	0·002671	0·003257	—	0 007747	—
·006708	0·005774	0·000849	0·002547	0·002887	0·000509	0·001613	0·007132
·010005	0·003011	0·014300	0 015624	—	0·014500	—	0·004000
trace.	S. trace.	—	trace.	—	S. trace.	—	S. trace.
·004330	0·007628	0·003085	—	—	0·000809	—	0·006777
—	—	—	trace.	trace.	—	—	—
—	trace.	trace.	—	0·000421	0·000252	trace.	0·000168
—	—	—	—	—	trace.	—	—
·000500	0·000700	0 000400	0·000800	0·000400	0 000500	—	0·000500
·000600	0·000900	0·001200	0·000500	0 000400	0·001300	—	0·001700
·997460	0·999136	1·001116	1·003730	0·997325	0·998010	0 995936	1·001565

Continued.

No. 20.	No. 21.	No. 22.	No. 23.	No. 24.	No. 25.	No. 26.	No. 27.
Liverpool Ashton.	Turk's Island.	Pomeroy, Ohio.	Curacoa.	Alleghany saline, Penna.	Cadiz.	St. Ubes.	Inagua.
0·941656	0·940776	0·938382	0·929816	0·915437	0·913722	0·890402	0·878509
0·044000	0·032000	0·046000	0·053000	0·064000	0·063000	0·061000	0·096000
0·000500	0·003600	trace.	0·001500	0·000800	0·001700	0·001900	0·005000
—	—	S. trace.	—	—	—	—	—
—	—	0·008971	—	0·013495	—	—	0·004844
0·002462	0·007047	0·005095	0·011036	0·005394	0·010699	0·023870	0·000594
0·012200	0·009400	—	0·002300	—	0·003300	0·009800	0·013059
trace.	traces.	—	trace.	—	traces.	traces.	—
0·001262	0·007530	—	0·007208	—	0·009942	0·014475	—
—	—	—	—	—	trace.	—	trace.
0·000421	—	trace.	trace.	0·000505	0·000252	0·000337	0·000336
—	—	—	—	—	—	—	—
0·000200	0·001000	trace.	trace.	0·000200	0·000300	0 000400	0·000100
0·000200	0·000600	trace.	trace.	0·000200	0·000700	0·000500	0·000200
1·002901	1·001953	0·998448	1·004860	1·000031	1·003615	1·002682	0·998642

Safety for Steamers on Fire.

In almost every instance of destruction of steamers by fire, access to the engine has been cut off; and while the flames are driven aft, by the speed of the vessel, they have no means of obtaining water. Could not a syphon-like pipe be introduced, when the vessel is being built, extending the whole length of the same, through which the water would flow freely, so as to give motion, when necessary, to a hydraulic ram when required?

The highest part of the pipe should be well aft, and it should not be higher above the water line than the point to which the minimum speed of the vessel would cause the water to rise; cocks could then be attached at various places so as to draw water if necessary. E. B.

Brooklyn, New York, January 29, 1859.

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*Experiments on Vegetable Parchment.**

The following are the details of the experiments referred to in article on page 56.

WATER LEAF PAPER,

broke, when loaded with

I.	II.	III.	Mean.
17 lbs.	15 lbs.	15 lbs.	15·6 lbs.

VEGETABLE PARCHMENT,

broke, when loaded with

I.	II.	III.	Mean.
78 lbs.	75 lbs.	70 lbs.	74 lbs.

ANIMAL PARCHMENT,

broke, when loaded with

I.	II.	III.	Mean.
92 lbs.	78 lbs.	56 lbs.	75 lbs.

The strips of vegetable and animal parchment were selected as nearly as possible of equal thickness, but the strips of artificial product were somewhat heavier than those of real parchment. On an average, the former weighed 18 grains, and the latter only 12·75 grains. Calculated for equal weights, the strength of animal parchment as compared with that of artificial parchment, is obviously $\frac{18}{12{\cdot}75} + 75 = 105$. In round numbers, it may be said that vegetable parchment has three-fourths the strength of animal parchment.

* From the Journal of the Society of Arts, No 313.

Discharge of Water by the Seine.

By means of the Pitot tube, the engineers have found that the quantity of water discharged by the Seine during the present summer, (1858) that is, at a very low level, is 45,592 litres (12,000 gals.) per second. In the month of October of last year, the river being some centimetres above its average, the flow measured at the bridge of Pecq was 102,332 litres (27,000 gals.) per second. *Cosmos.*

FRANKLIN INSTITUTE.

Proceedings of the Stated Monthly Meeting, January 20, 1859.

John C. Cresson, President, in the chair.

John Agnew, Vice President. } Present.
I. B. Garrigues, Recording Secretary. }

The minutes of the last meeting were read and approved.

Donations to the Library were received from the Royal Geographical Society, the Royal Astronomical Society, the Chemical Society, and the Society of Arts, London; K. K. Geographischen Gesellschaft, the Oesterreichischen Ingenieurs Verienes, Vienna, Austria; the Smithsonian Institution, and Charles Ellet, Jr., Esq., Washington City, D. C.; Hon. H. M. Phillips and Hon. T. B. Florence, U. S. Congress; B. H. Latrobe, Esq., and the Maryland Institute, Baltimore, Md.; Dr. B. A. Gould, Albany, New York; Charles B. Norton, Esq., City of New York; C. A. Walborn, Esq., Penna. Legislature; Prof. J. F. Frazer, Prof. B. H. Rand, John E. Addicks, Esq., and E. T. Freedley, Esq., Philadelphia.

The Periodicals received in exchange for the Journal of the Institute, were laid on the table.

The Treasurer's statement for December, 1858, and his annual statement for 1858 were read.

The Board of Managers and Standing Committees reported their minutes.

Candidates for membership in the Institute (3) were proposed, and the candidates proposed at the last meeting (141) were duly elected.

The Tellers of the Annual Election for Officers, Managers, and Auditors, for the ensuing year, reported the result, when the President declared the following gentlemen duly elected:—

John C. Cresson, President.

John Agnew, } Vice Presidents.
Matthias W. Baldwin, }

Isaac B. Garrigues, Recording Secretary.

Frederick Fraley, Corresponding Secretary.

John F. Frazer, Treasurer.

MANAGERS.

Samuel V. Merrick,	Thomas J. Weygandt,	James H. Bryson,
Thomas Fletcher,	Joseph J. Barras,	Ellis S. Archer,
Edwin Greble,	Joseph Harrison,	John M. Gries,
Thomas S. Stewart,	George Erety,	James Dougherty,
Alan Wood,	Evans Rogers,	George Whitney,
John E. Addicks,	Robert Cornelius,	Edward P. Eastwick,
Isaac S. Williams,	Lawrence Johnson,	Washington Jones,
George W. Conarroe,	William Sellers,	William H. Love.

AUDITORS.

Samuel Mason, James H. Cresson,
Samuel B. Finch.

At a meeting of the Board of Managers, held January 26th, 1859, the following officers were elected for the ensuing year:

Joseph Harrison, Chairman.

Isaac S. Williams, James H. Bryson, } **Curators.**

The attention of the President was called to the remonstrance against the introduction of gas-lighting, reported a day or two back in the daily papers as having been presented to the City Councils by himself and others in the year 1833.

In reply, he said it was true that he had signed such a paper, in company with several hundreds of his fellow citizens, and, moreover, that the statements there set forth as to the dangers and annoyances of gas manufacture were literally true at that day, he being able to testify, after personal inspection of nearly all the gas factories established prior to that period, that their condition was such as would cause them now to be considered intolerable nuisances; for the modes of manufacture and distribution were so imperfect, that gas was not thought fit to be admitted into private dwellings. The effect of the strong opposition to its introduction here, in that offensive manner, was such as to induce Councils to adopt the wise course of sending a competent agent to Europe to collect information on the subject and procure plans of all the best improvements there to be discovered. The person selected was Samuel V. Merrick, Esq., a gentleman admirably qualified for the mission, and he made such good use of his opportunities as to return in a few months with a fund of practical knowledge more extensive and complete than was then possessed by any other individual at home or abroad. He had been successful in obtaining access to all the principal gas works in England and Europe, with permission to examine fully their plans and processes, on condition that he should not publish nor reveal them to neighboring rivals. The various inventions and improvements thus discovered were combined for the first time in the plans for the Philadelphia Gas Works. They were of such value as to remove most of the serious objections to gas-lighting, and many of its former opponents, the speaker among them, united in recommending and promoting its immediate introduction, under municipal regulations, framed by the chairman of the special committee of Councils, F. Fraley, Esq., by which the city was effectually secured from any pecuniary risk, while retaining all needful control over the management of the enterprise.

If the actions of men are to be estimated by their results, then are these remonstrants entitled to approbation and grateful remembrance, not only in Philadelphia, but also in every place where gas is used; for the valuable improvements first exhibited in combination in the works constructed here, have been copied every where in the United States, both in works since founded and in those previously in operation, the latter having been entirely remodeled, and their engineers instructed according to Philadelphia methods. Nor have these benefits been confined to America; they have been returned to Europe, with

liberal additions to the improved plans originally derived from the older establishments.

With regard to the appropriateness of the comparison laid between this case and that of the railroad under argument, into which it was introduced, the speaker declined expressing any opinion, further than to suggest, that if the analogy intimated by the learned counsel by whom the remonstrance has been exhumed really exists, it would constitute a valid reason for pausing in our career of city railroads, until a general system can be matured on principles founded on public convenience, rather than the mere private interests of stockholders and speculators.

The discussion was closed with an allusion by the President of the Institute, who is also the Chief Engineer of the Gas Works, to some of the important regulations, originating here, for the security of gas consumers against the dangers and annoyances portrayed in the remonstrance. These have proved to be so well adapted to their purpose, that, after trial for nearly a quarter of a century, no reason has been discovered for making any material change in them.

Mr. A. C. Jones exhibited an apparatus (invented by himself and to be patented,) for weighing coal directly from the common coal cart. It is designed to supply a cheap method of weighing coal, or similar material, at the place of delivery. It consists of a scale arranged on a light frame, easily adjusted on curved bearings fastened to the top rods of the cart. This frame cannot be displaced by jolting, yet it may be slid up to the front of the cart, out of the way, when it is being filled.

Under the body of the cart a box is suspended by chains and hooks attached to a rod, passing across the cart, operated by a lever which in certain positions holds the box up firmly to the cart, so as to be carried safely over the roughest roads; puts it in place to be filled without injury to the scale bearings, or transfers the load to the scales to be weighed by a fixed small weight, representing a quarter of a "short ton," which may be changed to the "long ton," by placing a ring on the weight; the box is so suspended from the scale levers that it can be easily "tilted" with one hand, whilst the other relieves the hinged front of the box, and the load shoots out on the ground. By using a "prop" more than a quarter of a ton can be weighed at one time; but a quarter of a ton is believed to be the best size, as the few minutes extra required will more than be compensated for by rest to the horse, and also the whole apparatus may be so light as to be no drawback to its being carried with the load. When not required for weighing, the box and scale frame may be removed from the cart, to be replaced when wanted.

This scale will weigh correctly when one wheel of the cart is ten inches higher than the other, or if both wheels are in a deep gutter, thus giving the greater inclination to the cart.